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COST VERSUS SERVICE.

From figures presented in the article discussing the application of electric motor drive to shoe factories, appearing elsewhere in this issue, it is seen that the cost of power is but 0.5 per cent of the total cost of manufacturing a pair of shoes, while the labor cost is 20 per cent of the total. A similar relation exists in a large number of manufacturing industries, power representing but a small portion of the gross expense—frequently less than one per cent and rarely exceeding three per cent, even with the large power consumers.

Still, when opening a negotiation with a manufacturer for the use of central-station service, almost the first question asked is, "How much is it going to cost?", or, "What are your rates?" Many times the salesman will name him a rate, and thereafter he is on the defensive and must show the justification of the rate. He has only a slight opportunity to present the real benefits possible to be had from the service.

Successful power salesmen have found, however, that no mention should be made of rates, at least in the preliminary negotiations, but instead the manufacturer should be shown how central-station service has increased the net profit for others, and permission should be secured to conduct an investigation in the factory, to determine what benefit he would derive. By handling a prospect in this manner the subject of power cost becomes a detail, and when it is also shown, incidentally, that the central station can effect a saving on this item, the case is much strengthened.

Shoe manufacturing presents a striking example of the folly of comparing central-station power with other methods purely on a cost basis. In this industry, although live steam is required throughout the entire year, a saving of 25 per cent in favor of purchased power is possible, but this makes very little, if any, difference in the cost of manufacturing a pair of shoes. On the other hand, a factory with an average yearly business of $500,000 adopted central-station service and as a result increased its output 10 per cent, without additional labor or equipment. This additional output of $50,000 is obtained at practically the cost of the extra material, which is $20,000.

This is simply one of many cases that could be cited to emphasize the value of selling service and not making a question of rates the important item.

By selling service, also, the central station will eliminate the customer who compares his bill with the same month of the previous year and then complains if the former is higher. The manufacturer should know that the power consumed will be in proportion to his output.

IMPROVED RUBBER-COVERED WIRE.

Experience gained in the development of any art brings about a gradual raising of standards so as to overcome difficulties encountered and insure a carrying out of improved practice. In the extraordinarily rapid development of the electrical arts this rule has been manifested in almost numberless directions. One of these has been in the matter of insulation of apparatus and conductors. The importance of high-grade and permanent insulation is being forcibly demonstrated by an analysis of cases of fires of electrical origin and of fatal or serious shocks from contact with circuits of even moderate voltage. The subject has been given a great deal of study in recent years with the result that the shortcomings of various insulating materials are now better understood and means for improving these materials developed.

Rubber is one of the most important and extensively used insulating materials. Since pure rubber is unsuitable for insulation, a compound thereof with other ingredients must be used. Until a relatively few years ago not much attention was given to what was a reliable rubber compound and what the properties thereof should be. It then became known, however, that a large part of electrical fires and accidents were due to failure of rubber insulation. This brought about an effort to improve the quality of such insulation which culminated in the higher standards laid down in the 1911 edition of the National Electrical Code. Before the close of the year 1912 the new-Code rubber-covered wire was definitely required by electrical inspectors in practically all parts of the country. It was found that the new-Code rubber wire could be made at but a slightly higher cost than the old material.

Although more than a year has elapsed since nothing but new-Code wire was supposed to be used, electrical inspectors and others interested in improved electrical construction are still frequently finding the so-called old-Code wire being sold and used in wiring installations. The status of this situation was forcibly reported on by Mr. Victor H. Tousley, chairman of the Committee on Rubber-Covered Wire, at the Cincinnati convention of the Western Association of Electrical Inspectors. This journal has always stood and continues to stand strongly in favor of higher standards of electrical construction. Being heartily in sympathy with the aim of Mr. Tousley's report, we have reproduced it in full in another part of this issue, so that the importance of taking active measures to insure the use of only approved rubber-covered wire may be brought home to inspectors and contractors throughout the country.

It is interesting to note that several manufacturers are definitely known to still manufacture inferior wire, although they profess to turn out only high-class product and would not like the reputation of making shoddy goods. When it is realized that each case of shock or fire that can be traced to defective rubber insulation (and there are altogether too many of them) discredits the use of electricity and is therefore a blow at the entire electrical industry, there is brought home the need for more positive pressure than merely moral suasion on makers of and dealers in inferior wire. Neglect to see the trend of events may result in drastic or ill-advised legislation, as is too commonly the case where restraint of a few unscrupulous individuals brings hardships on many.

The specifications for rubber insulation laid down in the 1911 Code are such as to give a reasonably good quality of insulation. The present state of the art probably does not warrant the requirements for general use of still higher standards. However, there are many places in which a higher type of insulation is needed. As a result of prolonged study a committee composed of various interests seeking to improve rubber insulation has made a preliminary report and suggested a specification and tests for this higher product which will contain at least 30 per cent of pure rubber. A summary of this specification is also reproduced in this issue. It is of importance not only in those places where the best type of insulation is needed but also because it may be the basis for a standard higher than that now required by the Code to be generally adopted in the future for all rubber-covered wire.

APPEALING TO THE HOUSEKEEPER.

Many men in all branches of the electrical business realize that the typical residence is not so completely wired nor furnished with so many outlets as is necessary to supply the home with all the conveniences which a supply of electric current places at its disposal, and it is generally supposed that this feature of the situation is not recognized by others.

The correspondence which was presented at the recent meeting of the New Jersey Electrical Contractors' Association shows that this paucity of electrical facilities is recognized also by many housekeepers. The New Jersey Federation of Women's Clubs called upon the New Jersey contractors for the remedy for this difficulty, and fortunately the secretary of that association had an answer ready. He offered to furnish literature in any desired quantity to the women, showing them that their problem can be easily solved by giving the contractor orders to put in the appropriate outlets when wiring the home.

The incident suggests that the contractors should do more than this. It is always within the province of the contractor to suggest to the owner of a build-

ing plans, or changes in plans, that will make a more satisfactory installation and enable the occupant of the building to make a larger use of electrical facilities in the years to come. No contractor should fail to point out every case where he considers the design of the electrical installation inadequate. The above incident emphasizes that he might with advantage appeal to the future housekeeper of a residence building, and when she is properly informed in the matter her co-operation should carry great weight in securing a modification of the plans, which will usually mean a more extensive installation and more work for the contractor.

LOCAL ASSOCIATIONS AND GOOD CONSTRUCTION.

In his address before the New Jersey Contractors' Association, Mr. Arnold H. Moses made a suggestion which is worthy of the careful consideration of local associations of electrical contractors. This suggestion is that every such association shall appoint a committee which in any case of dispute shall pass upon the work of any of the members of that association and act as a board of arbitration between the member involved and the architect or owner of the building in which the work has been done. In case such work does not come up to the specifications or to the standard imposed by local requirements, such as a municipal or other code, the association should then discipline its member, and in an extreme case expel him from the organization. When the dishonest and unreliable contractors had thus been eliminated from such a local association, membership would become a greater asset to the electrical contractor and he would stand before the public as one who could be relied upon to properly fulfill a contract, even though the owner or other person in charge of the building was not sufficiently versed in the work to discover faults in the installation. An organization of this kind would be of great value to both the reputable contractors and to the public. Eventually such a condition of affairs would eliminate defective workmanship and material more completely than could any legal provision, such as the requirement for registration or license. This would apply especially in the smaller towns, where there is no regular corps of inspectors.

A proposition of this kind would have a great many of the advantages of the scheme for insuring the contractor's work without including the disadvantages of such a scheme. It merits the careful consideration of local associations of electrical contractors.

In every department of physical effort the most decided tendency of the times is to render adequate service and to compete not only in the matter of cost, but in the no less important matter of quality and ultimate satisfaction. The electrical contractor is worthy of emulation for his ready acceptance of this opportunity.

THE NATIONAL CHAMBER OF COMMERCE.

The annual convention of the National Chamber of Commerce, which was held at Washington, D. C., during the past week, brought together what was probably the greatest gathering of business men that the country has ever seen. The National Chamber, made up of the federated members of the chambers of commerce of the principal cities of the United States, represents the dominant business interests of the country. For the first time there has been made available a concrete answer upon the part of the commercial interests of the country to the proposed legislation within and without the Federal Cabinet, and within and without the House of Representatives and the Senate of the United States.

The work of the National Chamber of Commerce is to study the conditions from every angle, and prepare men in advance to discuss intelligently ways and means for arriving at the solution of problems confronting every commercial and social activity of the nation. Among the vital matters presented during the past week, the three most conspicuous were the report of the committee on patents, copyrights and trademarks, the symposium with respect to the so-called anti-trust legislation proposed by the present Congress, and the discussion of those things relating to the resale prices of manufactured goods.

On other pages of this issue there are given brief excerpts from several of the addresses made upon these topics. The nature of the organization of the Chamber is such that after analysis and study of conditions it can only recommend further ways and means for working toward the solution of the problems involved. It is well, however, that when we have arrived at a condition so fraught with immense possibilities that we have available this forum before which these questions may be debated, and it is inconceivable, when representing the highest intellectual development of the country in commerce and industry, that these recommendations can have other than a most potent influence upon the future course of the country whatever it may be. It seems to us that the keynote of the situation as enunciated by practically every speaker before the convention, is the determination to conserve that which we have so that our commercial prosperity remain unimpaired while we are working gradually to a conformity with modern conceptions of the way in which we should go. As Mr. Fish points out, "back of all the suggestions as to detailed legislation is the broad question of whether we are approaching the subject of the proper control and development of our industry in the right way. It would be greatly to our advantage if that underlying condition could be studied and we could be sure that it was settled on a sound basis before we advance further into the regions of the unknown by adopting speculative suggestions based on unproved or at least doubtful theories rather than on the facts and necessities of our business situation."

Electrical Advertising Discussed Before Chicago Jovian League.

Some of the basic principles of advertising were interestingly discussed at the meeting of the Chicago Jovian League on February 9, by A. N. Fox, advertising manager of the Benjamin Electric Manufacturing Company. Mr. Fox said that advertising copy should be the mouthpiece of the manufacturer and as such should present logical selling arguments and descriptions of the product advertised rather than a pictorial display of the product with screaming adjectives designed to stun the reader. Advertising must also be true as, in the words of Mr. Fox, "there is a time fuse on every false campaign." Advertising is not an exact science. Mr. Fox pointed out that good advertising is an asset to any company. Good printing is essential to good advertising. In considering advertising media, Mr. Fox stated that it is equally as important to give consideration to a publication's editorial policy as to its circulation statement.

A. A. Gray called attention to the action of the Federation of Trade Press Associations requiring a circulation statement from publications as a requisite of membership.

Attention was called to the rejuvenation of the Sons of Jove which will be held March 5, at the Hotel Sherman. Dinner at $1.50 per plate will be served at 6:30 p. m. and the rejuvenation will follow. Victor H. Tousley is chairman of the membership committee.

Program of Meeting of Tennessee Contractors.

The Tennessee Electrical Contractors' Association will hold its third annual convention at the Hotel Chisca, Memphis, Tenn., on February 16 and 17. Contractors, central-station men, street railway men, jobbers, manufacturers and electrical engineers from Arkansas and Mississippi, as well as Tennessee, are invited to attend this meeting.

At the opening session at 10 a. m., on Monday, February 16, there will be an address of welcome by C. O. Scholder, president of the Business Men's Club, and a response by J. P. Lawrence, president of the association. J. F. Ramier, Jovian statesman, will make an address on "Co-operation Between the Central Station and Contractor;" W. R. Herstein will speak on "Practical Jovianism," and J. A. Fowler on "Humor and Pathos of Electrical Contracting."

In the afternoon there will be a closed session devoted to legislative matters, architectural relations, business management and ethical relations.

At 11 a. m., on Tuesday there will be addresses by Ernest Freeman, president of the National Electrical Contractors' Association, and Ell C. Bennett, Mercury of the Jovian Order.

On Tuesday afternoon there will be a closed session with papers as follows: "The National Association," by Ernest Freeman; "Twists of the National Code," by Ernest McCleary; "Data and Sales Book," by G. M. Sanborn; "Why More Members," by J. T. Marron; "New Laws," by P. H. Jaehnig; "The Jovian Order," by Ell C. Bennett; "Labor Troubles," by J. A. Fowler; "The Journal," by G. H. Duffield; "Bookkeeping," by G. W. Hill. Mr. Duffield is secretary of the National Electrical Contractors' Association, and Mr. Hill is its special representative.

On Monday afternoon there will be a reception and tea for the ladies and the evening will be spent at the Automobile Show. On Tuesday morning, prior to the session, there will be a reception to President and Mrs. Freeman and the other visitors. In the afternoon there will be an automobile ride, and in the evening an electrical parade, a banquet and a Jovian rejuvenation.

Bion J. Arnold Talks on Subways to Chicago Electric Club.

At the meeting of the Electric Club, Chicago, held on February 5, nearly 250 members and guests were present to hear Bion J. Arnold give an illustrated talk on subways. Since the construction of passenger subways will probably form a referendum subject at the next municipal election in April, the closest attention was given to Mr. Arnold's discussion of the principles that should govern such construction and to the explanation of his plans for beginning and extending the work.

In introducing the speaker, President Bone called attention to some of Mr. Arnold's suggestions for increasing the capacity of the New York Interborough subways. Mr. Arnold began his talk by dwelling on these points: He said that by following his advice as to installing side doors in the cars, an automatic door-controlled system of signaling the motormen, increasing the length of the stations and trains, and developing an improved, automatic, speed-governed train stop, the capacity of the Interborough subway system was increased from 500,000 to 1,200,000 passengers a day. He cited this to show the importance of proper design in order to give maximum capacity for the very heavy investment involved in subway construction.

Taking up the Chicago situation, Mr. Arnold read from the report he presented in 1911, when he was chief subway engineer for the city of Chicago. Practically all of the principles then laid down still hold true; the various steps in the execution of the plans then proposed can be carried out with slight alterations due to recent changes in the ownership and operation of the traction systems. Practically all of the construction now planned by the Board of Supervising Engineers, of which Mr. Arnold is chairman, can be built so as to form parts of a comprehensive system of subways covering the entire city with a network of high-speed lines. The initial work contemplated is modest in scope and can be built within a few years with money in hand or in sight and without burdening the taxpayers with bond issues or guarantees of the securities of a construction company. With moneys coming into the traction fund from year to year, the initial bores can be extended and added to, so that gradually a comprehensive system will be developed to keep pace with the urgent traffic demands of the community.

Mr. Arnold stated that grade crossings should and can be avoided at intersecting points. He showed plans and elevations how this can be done, both in two-track and four-track subways by having, say, the north and south subways cross over the east and west subways. He showed how the utilities under the streets should be provided for as a feature of subway construction. He dwelt on the need for opening up additional through streets and explained the plans for beginning this work.

Early in the meeting President Bone referred to a communication from the Colorado Electric Club announcing that it now has passed the 900 mark in membership. Secretary Ehrlich read the names of several applicants. The Chicago Electric Club is now actively striving to increase its membership to 1,000 before the close of the present year.

Voting Machine Favored for House of Representatives.

The scheme proposed by Representative Allan B. Walsh for recording votes in the House of Representatives at Washington has received a favorable report at the hands of the Subcommittee of the House of Commitee on Rules. This proposition was referred to in our issue of August 2, 1913 and consists of electrically recording the vote of each member when he presses a button at his desk. The scheme provides for visual signals of the votes by means of colored lamps and a permanent record by means of holes which will be punched in cards bearing the membership list of the house.

Not only has the Commitee reported in favor of the scheme, but it is understood to be supported by Speaker Clark, Representative Underwood, Elliott Woods, superintendent of the Capitol Building, and other prominent men.

J. W. Benham.

Very often in the development of an industry or of a business connected with an industry, there is evolved a man and his work between whom and which there is a striking similarity. In thinking about the lumber industry, and particularly that part of the industry which is related to the production of the giant poles which go into so much of the long-distance transmission lines of light and power companies, one is apt to think of rugged and virile characteristics. It is a fact also that in thinking about so many men connected with the lumber industry and particularly that part of the industry, which is devoted to the products familiar to the light and power industry, that men of rugged, virile charactertistics are considered. There is a striking similarity between the man and the business in the characteristics of J. W. Benham, recently elected president of the Northern White Cedar Association. For many years the Association was known as the Northwestern Cedarmen's Association. So that the products handled by the members of the Association might be more specified, a number of the prominent members of the organization have sought for some time to bring about a change in name. Consequent upon this effort, at the annual meeting held several weeks ago, the name was changed to that above announced, and among those who have taken a most conspicuous part in thus establishing a more specific name for the Association none is more prominent than the subject of this sketch.

J. W. Benham,
President, Northern White Cedar Association.

James W. Benham was born in Minneapolis, Minn., in 1866. Going to California when a baby he was educated at San Francisco, in his early youth going down into Arizona and becoming identified with the cattle industry. There he took an active interest in territorial politics and his aggressive, enterprising qualities of good citizenship established for him an early renown as a champion of better things in municipal and statewise affairs. He was in turn a member of the Legislature, one of the first and most active promoters for statehood rights for Arizona, was a member of the first live stock sanitary board of Arizona Territory and a member of the first forestry organization of the territory. Two members of this first commission are at the present time head men of the forestry service.

In 1901 Mr. Benham went into business in New York City. Coming to Chicago in 1906, having attracted the personal attention of the late Gilbert B. Shaw, he became a member of the firm, which was then a partnership, of Mr. Shaw and A. T. Naugle. When the firm of the Naugle Pole & Tie Company was incorporated in 1910, Mr. Benham became secretary and treasurer, the other officers being C. E. Maxwell, president, and A. T. Naugle, vice-president. Mr. Benham has since held this position, which carries with it the practical management and direction of the selling organization of the company. It is largely through Mr. Benham's efforts, therefore, that the company has assumed its position among the leaders of pole industry. Facilities have been increased, large yards established where big supplies of material are concentrated, and the company is in a fortunate position not only with respect to northern white cedar, but also with respect to western lumber as well.

Mr. Benham's first connection in association matters was in 1906, when he attended the annual meeting of the Northwestern Cedarmen's Association. From that time he has been an active worker for the interests of the Association, and has taken a leading part in developing the latent forces of associated effort, bringing about a better understanding of conditions throughout the entire industry and establishing the production and selling of white cedar upon a mutually satisfactory basis to both producer and consumer. Under the administration of Mr. Benham it is expected that the Northern White Cedar Association will go on to greater accomplishment. Among the things that Mr. Benham hopes to see materialize during the coming year is the establishment of a closer relationship of the Association with the railroads carrying its products, the advancement of the proposition of equitable rates, allowances for staking and a more equitable disposition with respect to minimum weights and other matters of this character. He is also devoted to the proposition of bringing to the attention of the public the value of white cedar for poles, posts and ties, to say nothing of its value as building construction material. He is of the opinion that if the general public is better informed with respect to the qualities of white cedar, that a very much improved market will be established. To this end a considerable sum of money has been subscribed to participate in an aggressive educational campaign of publicity.

Personally, Mr. Benham is more than popular with the other cedarmen in the business. He enjoys their confidence and esteem, and all this with due modesty and a desire only to be given the privilege of working full time for the development of a bigger and better business and social opportunity for his fellow cedar producers.

Peoria Show Postponed.

The Peoria Electric Club held its regular meeting in the Garden Room of the Jefferson Hotel, Peoria, Ill., on February 7. It was decided to postpone the Electric Show that had been planned for March owing to failure to make satisfactory arrangements for a hall.

There was a large attendance at the meeting and several members spoke. Mr. Vance, of the Traction Company, gave a talk on "How to Skin a Salesman," saying that it could not be done. Mr. Wolgamott spoke on "The Easy Life of the City Electrician."

Philadelphia Section Activities.

At the January meeting of the Philadelphia Electric Company Section, National Electric Light Association, held on January 19, Prof. Robert H. Fernald, of the Towne Scientific School of the University of Pennsylvania, delivered a lecture upon the subject, "The Possible Central-Station Plant of the Near Future." The gist of his discourse was that the central-station plant of the near future would be located at or near the point where coal is mined, or actually in the mine itself. By charts he showed that the consumption of coal had increased to a remarkable, almost an alarming, extent in the last 50 years, and pointed out that unless some more economical method of using fuel was employed, the country would in a century or so find itself entirely out of coal. He described the use of the coal in producer-gas engines for the purpose of deriving energy with which to drive electrical machinery, as against the present method of generating steam to drive such apparatus, drawing his information from authoritative sources, and his discourse was not only interesting, but impressive, and the two hundred members of the Section who were present at the meeting were duly impressed with the seriousness of this phase of the electrical industry.

The Accounting Department Branch held its meeting on January 13. The paper of the evening was entitled "Depreciation as an Essential Factor in Determining Profits," and was presented by Elwood G. Walls, an employee in the consumers' accounts division. Mr. Walls showed by his paper that the boys of the department are giving their thoughts to other things than just those particular duties which come to their hands. The paper was masterful and was ably presented, and it is hoped to have more of such papers by the employees of the department at future meetings. A mock trial was the entertainment feature of the evening, and followed the discussion of the paper.

The Meter Department and the Engineering Department Branch held a combination meeting on January 5. This was the first joint meeting of any branches of the section and was a pronounced success. The Peconela orchestra opened the meeting by playing a delightful overture. Louis C. Smith spoke of the early days of the company's history, referring particularly to the old Meter Department. The Good and Welfare Committee, following the discourse of the evening, provided refreshments. During this part of the program, monologues, vocal and instrumental selections were offered by several members of the branches.

The Commercial Branch held its January meeting on Monday, January 26. The paper of the evening was "Selling Electric Power," and was read by Edwin Hulley, of the Power Department. The presentation of the paper was followed by an animated discussion.

The Special Prize Award Committee, in the contest for the John Meyer prize to the member naming the greatest number of electrical devices and the greatest number of practical uses to which the appliances could be put, announced the conclusion of the contest, with the following results: Winner, R. L. Lloyd, who enumerated 193 appliances, of which seven devices had 24 practical applications; honorable mention, R. B. Ely, who enumerated 116 appliances, of which ten devices had 20 practical uses; specially commended, Daniel A. Fitzgerald, who had a list of 175 appliances.

Lynn Section Meeting.

William B. Potter, engineer of the Railway Department of the General Electric Company, lectured on February 4, before the Lynn Section of the American Institute of Electrical Engineers, the subject being "Electrification of Railroads." The speaker was introduced by Elihu Thomson, who referred to the pioneer work in railway motors in 1887 at Lynn, and a little later when the West End road was electrified.

The first part of Mr. Potter's lecture was devoted to a historical survey of the evolution of the electric car, and he made interesting comments on European practice of today as compared with that obtaining in America. Accompanying the lecture a comprehensive series of lantern slides, covering almost every phase of railway equipment here and abroad was shown.

A social hour, when refreshments were served, followed the lecture.

The next meeting will be in Burdett Hall, when Elihu Thomson is to lecture on Color Photography.

Dinner of Brooklyn Contractors.

The eighth annual dinner given by the Edison Electric Illuminating Company, of Brooklyn, N. Y., to the electrical contractors of that city was held at the Academy of Music on February 7.

W. F. Wells, vice-president of the Edison Electric Illuminating Company, spoke of the development of the electric business in Brooklyn during the last decade. When the company gave a dinner to the electrical contractors of the city in 1892 there were so few of them that they all sat around a single table. The company had about 1,000 customers at that time; whereas during the past year it signed 23,000 contracts.

Theodore I. Jones, general sales agent of the company, acted as toastmaster, and the other speakers were: James R. Strong, former president of the National Electrical Contractors' Association; Joseph C. Forsythe, chief inspector of the New York Board of Underwriters; Louis Kalischer, president of the Electrical Contractors' Association of Long Island; Frank W. Conn, president of the Manufacturers' and Business Men's Association, and Lewis H. Pounds, borough president.

Vehicle Association Appoints Permanent Executive.

The increasing work of the Electric Vehicle Association of America in extending the Association's influences and efforts in demonstrating the value of electric wagons has made it extremely difficult for the officers to properly administer its affairs without neglecting other business. It was, consequently, decided to establish the position of permanent executive secretary and inaugurate a system for the rapid dispatch of the Association's work. Albert Jackson Marshall has been appointed to the position of executive secretary and will carry on the work of the Association at 29 West Thirty-ninth Street, New York City. Mr. Jackson was well known in the field of illuminating engineering, having been connected at one time with the Holophane Company, and served as editor of the *Illuminating Engineer*. He is well known in the central-station field and has lately been associated with the General Motors Truck Company.

Boston Vehicle Notes.

At the next meeting of the New England section, Electric Vehicle Association of America, to be held on February 25, W. W. Scott, editor of *The Motor Truck*, will make an address on the goods-delivery system in Boston.

The second annual show of automobiles to be held by the Wollaston Center Garage, will occur on February 28 and March 2, 3, 4 and 5. A number of electrics will be on exhibition.

Edward S. Mansfield, Day Baker, O. G. Draper and E. A. Gilmore constitute a committee of electric-vehicle men who are working with other automobile organizations for legislation favorable to automobile interests. Mr. Gilmore is president and Mr. Draper secretary of the joint committee. One of the measures advocated is that which requires lights to be displayed on all vehicles on the public highways, and a proposed enactment that is opposed is one which aims to impose a registration fee of $5 a ton on all commercial automobiles.

Discussion of National Code.

An electrical conference to discuss the National Electrical Code, will be held at 256 South Eleventh Street, Philadelphia, Pa., on Thursday, February 26, at 7:30 p. m. This is primarily for the benefit of local inspectors.

Electricity in Shoe Manufacturing.

In a previous discussion of the application of electric drive to shoe factories, by H. O. Stewart (see issue of December 7, 1912), it was pointed out that the most important advantage of central-station service to shoe factories is the material decrease in unit cost which results, or, in other words, an increase in output with present equipment and labor. This is due principally to the uniform speed of motor driven machines, whether driven by individual motors or in small groups, as is usually preferable in shoe factories.

The material decrease in unit cost of production is one of the principal advantages attending the use of central-station service in shoe factories. Reductions in operating costs, averaging 25 per cent are of little importance when compared with the increased production possible with the same labor and equipment. Data are given on several plants purchasing power.

Group of Eyelet Machines in Shoe Factory Driven from Floor Below by a Three-Horsepower Motor.

A reciprocating steam engine seems to give a steady speed when a speed indicator of the usual type is applied to its shaft. The rapid variations in angular velocity due to the change from linear to rotating motion, while too rapid to be seen, are usually great enough to cause wastage and to unduly shorten the useful life of shoe machinery.

A long shaft driven by reciprocating engines often shows 10 per cent speed variation at the end farthest from the prime mover. This variation is caused by the initial unsteadiness of the prime mover, accentuated by the slipping and crowning of belts partly due to glazed spots and by the jerks of the machines themselves.

The steadiness of electric drive with their constant angular velocity, increases the useful life of the driven machinery and greatly reduces wastage.

The slipping of belts between engine and driven machine frequently results in 10 to 20 per cent loss of speed in the latter. With group electric drive the number of belts and shafts is greatly reduced, while with individual-motor drive they are entirely eliminated and each machine is kept up to its maximum productive speed at all times.

Also, a careful study of the manufacturing processes often suggests a much better arrangement of the machinery. The proper machine layout, only possible with electric drive, means a minimum handling of material with the maximum facility for rapid work. It is often found that certain machines retard the entire factory output. Obsolete or worn-out machines should be discarded and replaced by modern machines of ample capacity. The addition of a machine or employee in a process which is

limiting the factory output will generally increase the output. The substitution of modern machinery to perform these processes carried on by hand not only lowers the cost of production, but also increases the output. This is strikingly true of shoe machinery.

Where electric drive is employed, the routing of material and the necessary light can be determining factors of location. Corners which could not be used with mechanical drives become productive with individual or small group drives.

These advantages result in more production and less wastage, conditions which are necessary for success in these days of curtailment and competition. As an example, consider a factory with an average yearly business of $500,000. By means of scientific methods, its output has been increased 10 per cent without additional equipment or labor. This additional output of $50,000 is obtained at practically the cost of the extra material, which is 40 per cent of this amount, or $20,000. The 10 per cent increased output brings a return of $30,000 profit for an investment of but $20,000 in material. The manufacturer actually earns 150 per cent profit on this additional output and only from 5 to 10 per cent on his average output. If the profit on his average output were 5 per cent, the 10 per cent increased output would more than double his average profit, his total profit, being $55,000 while his average profit is but $25,000.

Increased output can almost always be obtained by improving the mechanical and physical conditions and details, and by keeping accurate and continuous records of each machine, or, at least, of each group of machines.

Fitting Room of Modern Shoe Factory. Machines Driven from Floor Below.

The fact that increased production results from motor drive should, therefore, be given the greatest consideration by the central-station salesman when soliciting this class of business. As live steam is required throughout the entire year in shoe factories the margin, in favor of central-station power, when considered solely on a comparative-cost basis is usually not sufficiently attractive to induce the factory manager to discard his engine and lineshaft drive or his electric power plant, particularly if the investment in the existing installation is high.

A reduction of 25 per cent in the cost of power by the use of central-station service, which is the usual economy effected, means but a very small reduction in the cost of manufacture, as the average energy consumption per pair of shoes is one-third of a kilowatt-hour. At a rate of three cents per kilowatt-hour, the power would cost one cent per pair of shoes. The cost of a pair of shoes manufactured for $2.00 could be itemized as follows:

Power	0.5 per cent
Labor	20 per cent
Material	40 per cent
All other charges	39.5 per cent

A 25-per cent decrease in the cost of power, therefore, does not materially reduce the cost of manufacture.

There are other important advantages of motor drive and central-station power that apply specifically to shoe factories, in addition to those already discussed. In addition to the arrangement of machinery for the best possible routing of material, it should be remembered that good illumination which is made possible by the removal of belts and shafting, increases the output and decreases the number of seconds.

In the foregoing table it was pointed out that the labor item in the cost of manufacturing a pair of shoes amounted to approximately 20 per cent of the total cost. As this item is such a large one it is obvious that reliable power is of the greatest im-

Method of Mounting Motors on Ceiling for Driving Machines on Floor Above.

Shoe Manufacturing Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Shoe company, located in Sheboygan, Wis., manufacturing an average of 225 pairs of shoes per day. There are 35 men employed working 10 hours per day.

Total connected horsepower, 18.5. Total number of motors installed, 5. Average kilowatt-hours per month, 1,069. Average kilowatt-hours per month per horsepower connected, 57.8. Average kilowatt-hours per day, 42.5.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
July	623	November	1,170	March	343
August	926	December	1,019	April	2,164
September	1,018	January	965	May	1,062
October	1,093	February	1,185	June	1,263

Load-factor, 10.6 per cent; operating-time load-factor, 22.2 per cent.

Measured maximum demand, 6.85 kilowatts.

The average electrical energy consumption per pair of shoes manufactured is 0.188 kilowatt-hours.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is two-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	5	1,800	Belted to line shaft, driving two dieing machines; one roller; one press; one Puritan stitching machine; one top skiver; and two tacking machines.
1	3	1,200	Belted direct to one dieing machine.
1	7.5	1,800	Belted to line shaft driving one leveling machine; one heeling machine; one McKay machine; one standard screw machine; one loose nailer; one heel trimmer; one edge trimmer; one edge setter; one edge brush; one heel waxer; one heel scourer; and one buffing machine.
1	1	1,800	Belted to line shaft driving two needle stayers; one trimmer; one needle-top machine; one single-top machine; one hook-top machine; and one eyelet machine.
1	2	1,800	Belted to line shaft driving two Puritan sewing machines; one waxing machine; one trimmer; two Post machines; one tip-punch machine; one skiver; one Zig Zag machine; one two-needle flat-back machine; one two-needle post-back machine; one single nail machine; and one eyelet machine.

Shoe manufacturing plant operating 54 hours per week. No figures are available concerning output and number of employees.

Total connected horsepower, 50.5. Total number of motors installed. 8. Average kilowatt-hours per month, 5,081. Average kilowatt-hours per month per horsepower connected, 100.6. Average kilowatt-hours per day, 195.4.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	6,988	May	4,692	September	5,082
February	5,800	June	5,092	October	4,404
March	5,720	July	3,236	November	4,684
April	5,820	August	5,372	December	4,080

Load-factor, 18.5; operating-time load-factor, 43 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	7.5	950	Direct-connected to a 40-inch Sturtevant fan.
1	0.5	1,800	Direct connected to small exhaust fan.
1	7.5	950	Belted direct to mechanism of 3,000-pound freight elevator.
1	5	1,200	Belted to line shafting driving 65 stitching machines.
1	10	1,200	Belted to a line shaft driving three lasting machines; two pulling machines; one stretcher; one Puritan stitching machine; three beveling machines; and three brushing machines.
1	5	1,800	Belted to a short line shaft driving two buffing machines.
1	10	1,200	Belted to a line shaft driving three edge setters; one heel burnisher; four edge trimmers; three heel scourers; one heel trimmer; two heeling machines; one emery wheel; and two sluggers.
1	5	1,200	Belted to a line shaft driving two finishing shafts; two Wheeler & Wilson sewing machines; two rounding machines; five channeling machines; and one molding machine.

All machines are manufactured by the United Shoe Machinery Company.

All motors installed are of the squirrel-cage induction type.

Shoe Manufacturing Data—Sheet No. 2.

Shoe manufacturing plant, located in Sheboygan, Wis., having an average daily output of 900 pairs of shoes. There are 100 men employed working 10 hours per day.

Total connected horsepower, 38. Total number of motors installed, 5. Average kilowatt-hours per month, 5,523. Average kilowatt-hours per month per connected horsepower, 145.3. Average kilowatt-hours per day, 212.5.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	4,820	May	5,350	September	5,420
February	5,510	June	5,320	October	6,090
March	4,990	July	4,710	November	6,850
April	5,410	August	5,060	December	6,750

Load-factor, 26.7 per cent; operating-time load-factor, 56 per cent.

The approximate electrical energy consumption per pair of shoes manufactured is 0.048 kilowatt-hours.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is two-phase, 60 cycles, 110 volts.

No.	Horse-power.	Speed. R. P. M.	Application.
1	5	1,800	Belted to a line shaft driving 10 Model C, Ideal, clicking machines, manufactured by the United Shoe Machinery Company.
1	3	1,800	Belted to line shaft driving one Amazon skiver; one tip punch; 20 Wheeler & Wilson sewing machines; three eyelet machines; two hook machines; and three Puritan wax-thread machines.
1	10	1,200	Extended-shaft motor belted to two 30-foot 7-hanger line shafts driving four gearless sole-cutting machines; one roller; one tip skiver; one counter skiver; one summit skiver; one wire-grip tacker; two Puritan stitchers; one sole molder; one toe-gouging machine; one heel compressor; and one Boston tacker.
1	5	1,800	Belted direct to one 40-inch dust-collecting fan.
1	15	1,800	Extended-shaft motor belted to one 60-foot 10-hanger line shaft and one 40-foot 7-hanger line shaft driving one freight elevator, two assembling machines; one pulling-over machine; four nigger-head lasters; one pounding machine; two wire-grip tackers; one Standard screw machine; three loose nailing machines; one leveling machine; one heeling machine; two buffing machines; one heel trimmer; one breaster; two edge trimmers; two heel scourers; one twin edge setter; and four finishing machines.

Shoe factory located in Sheboygan, Wis., having an average daily output of 600 pairs of shoes. There are 53 men employed, working 60 hours per week.

Total connected horsepower, 31. Total number of motors installed, 4. Average kilowatt-hours per month, 2,900. Average kilowatt-hours per month per horsepower connected, 93.5. Average kilowatt-hours per day, 111.5.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
December	3,029	April	2,770	August	2,899
January	2,972	May	2,635	September	3,253
February	2,949	June	2,917	October	2,246
March	3,113	July	1,943	November	4,078

Load-factor, 17 per cent; operating-time load-factor, 36 per cent.

Measured maximum demand, 12.8 kilowatts.

The approximate electrical energy consumption per pair of shoes manufactured is 0.186 kilowatt-hours.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is two-phase, 60 cycles, 110 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	15	1,140	Belted to line shaft driving one model A leveling machine; one nailing machine; one auto. heel loader; one slugging machine; one heel trimmer; one knife grinder; one freight elevator; one heel breaster; two edge trimmers; one scouring wheel; one heel waxer; one edge waxer; one buffer; one bottom finisher; and one 20-inch blower.
1	7.5	1,140	Belted to line shaft driving one Standard screw machine; two loose nailers; one McKay sewing machine; one tacker; one pounder; one laster; one assembly machine; one pull-over machine; one laster; 13 sewing machines; one perforator; one skiving machine; one studding machine; two eyelet machines; and one pounder.
1	2	1,800	Belted to line shaft driving one emery wheel; one splitting machine; two clicking machines; one lining machine; and one rubbing machine.
1	7.5	1,800	Belted to line shaft driving two cutting machines; one skiving machine; one heel compressing machine; one rolling machine; one splitting machine; one sole rounder; one tacker; one sewing machine; one heel trimmer; one heeling machine; one splitting machine; one skiver; one molder; one emery wheel; and two channel openers.

Group of Motor-Driven Die-Cutting Machines.

portance in shoe factories. There is no doubt but that the modern central station is better equipped and actually does give better service than an isolated plant. The central-station company's spare engines and boilers are ready to throw in in case of trouble, and an organized body of trained operators meet quickly any emergency. These facts usually do not prevail in a private plant.

A shutdown of any group of machines or department can be avoided by holding in reserve a motor of sufficient capacity to operate any department. This motor should be mounted on a truck and wired so that it can be quickly moved to any part of the factory, connected to the nearest panel box, and its pulley belted to the shafting.

Cycle of Operations.

On account of its complexity and the unusually large number of operations involved, shoe manufacture is less understood by the engineering profession than any other line of manufacturing which is so extensively carried on. For this reason a somewhat detailed description of shoe manufacture, in so far as it is related to power utilization, is given.

In general, shoe factories buy their patterns and lasts from manufacturers who devote their entire effort to the manufacture of either one or the other. Shoe manufacture, then, usually commences in the cutting department, where the leather is cut into uppers, outsoles, insoles, and so forth; and the linings, stays, facings, trimmings, and so on, are cut out. These parts then go to the fitting department where they are assembled. The completed upper now goes to the lasting department, where the last is inserted and the insole and outsole are fastened to the upper. The shoe now goes to the finishing department, where the sole is smoothed, the heel put on, and the shoe finished.

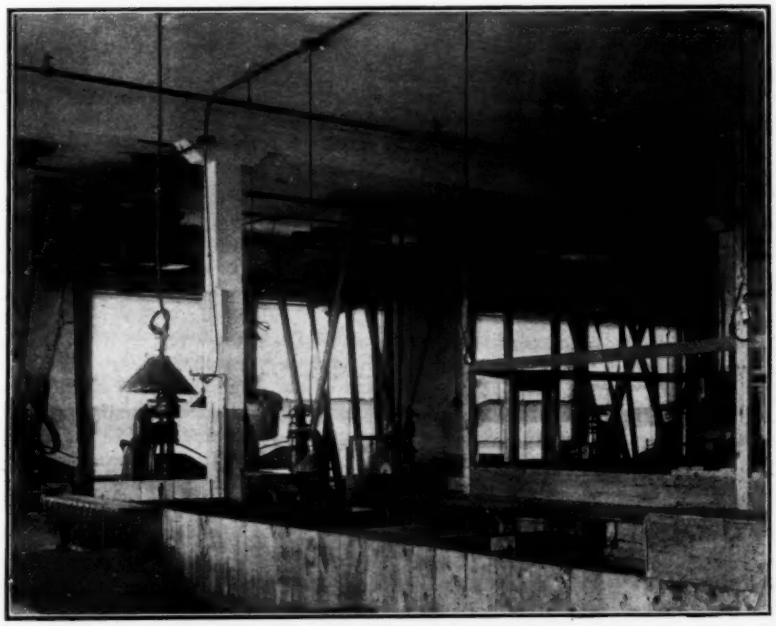
The leather for the uppers comes into the cutting department in large pieces, tanned and ready for use. The cutter selects that part of the skin best suited for each part of the upper and cuts it out either by hand or by a power-operated die. The trimming cutter cuts out the linings, stays, facings, and so forth. These are of cloth, and when a power-driven die is used, a great many are cut at a time. These parts are properly marked, tied up in bundles, and sent to the fitting department.

The assembling of the upper takes place in the fitting department. When the edges of the leather are to be turned, they are first beveled or skived, then cemented, turned, and pressed into shape with the folding machine. Leather and linings are assembled by stitching and pasting. Some of the sewing machines sew two pieces of lining together and stay the seam up with tape at the same time.

Eyelets are now inserted in the uppers of the laced shoes by eyelet machines. Buttonholes are cut and sewed by automatic buttonhole machinery. Another machine sews the buttons on.

The completed upper is sent to the lasting department, where the last is first inserted, and then the counter and insole. The shoe is steamed slightly and then put on a lasting machine, which pulls the bottom edges of the upper over the bottom of the insole and fastens it with tacks. The surplus leather which has been folded over on the insole is removed and the edges beveled on an emery wheel.

The outsoles are cut from large sheets of heavy leather with power-operated dies. They are fastened to the insole, either by the Goodyear welt process, or by the McKay process. The former process consists in sewing a strip of leather about two-thirds of an inch wide around the insole near its outer edge. The insole is so channeled



Three-Horsepower Motor Driving Six Clicking Machines.

and turned that the welt is sewed to the turned edge without the stitches going through to the inner side of the insole. The space on the insole inside of the welt is now filled with cement and cork, felt, or leather. The shank is inserted and tacked in place. The outsole is now cemented and pressed onto the insole. The sole then goes through the rounding machine, which trims and channels it for stitching. The outsole is now stitched to the welt. The edge of the outsole which was channeled and turned up for stitching is now cemented, turned down, and pressed in place with a power press.

By the McKay process the welt is cemented to the outsole, the space on the insole inside of the welt filled as in the other process, the shank inserted, and the outsole cemented and fastened with a few tacks to the insole by use of a tacking machine. The sole is trimmed, channeled, and stitched, the stitches going through the insole, upper, welt, and outsole.

The shoe is now placed in a leveling machine, which shapes the sole and thoroughly irons it.

Heels are made up of a number of shaped layers of leatherboard cemented and nailed together. Holes are punched in the built-up heels with a pricking machine. A heeling machine places nails in these holes, drives them through the sole of the shoe and rivets them on the inside of the insole. The top lift of the heel is cemented and nailed on.

The shoe now goes to the finishing department, where the heels and soles are carefully trimmed and shaped with an edging machine. A breasting machine is used to shape the concave end of the heel. The bottoms are now sandpapered, blackened, and burnished; the uppers are cleaned, ironed, blackened, inspected, and the shoe is ready to be packed for shipment.

Power Requirements.

The machinery in shoe factories is invariably driven in groups at constant speed. This is because of the fact that a large number of machines are used each taking a comparatively small amount of power. Also, the load on each machine fluctuates rapidly and at fairly regular periods. On account of the diversity-factor among the machines, group drive permits of the use of a fewer number of motors of much less aggregate horsepower than could be obtained with individual drive.

The accompanying table shows the approximate horsepower input to shoe machinery.

These figures will vary somewhat under different conditions but are sufficiently accurate for average conditions.

Horsepower Input to Shoe Machinery.

	Horsepower.
Consolidated hand laster	0.5
Lasting machine	0.3
Pulling-over machine	0.1
Adams sole cutter	2.0
Single sole molder	0.8
Counter molder	0.6
Twin molder	0.8
Crimping machine	0.5
Clicking machine	0.1
Cementing machine	0.1
Beating-out machine	0.2
Sole-laying machine	1.5
Slugging machine	0.5
Leather roller	0.2
Staple-fastening machine	0.2
Chicago wire fastener	0.3
Knox beam dinker	0.2
Goodyear welt machine	0.4
Welt beater	0.1
Goodyear rapid stitching machine	0.4
Atlas stiching machine	1.3
Hercules stitching machine	0.8
Automatic stitching machine	0.9
McKay stitcher	0.2
Puritan stitcher	0.2
Sewing machines	0.1 to 0.2
Knox end splitter	0.6
Stanley leather splitter	0.6
Amazon No. 7 skiving machine	0.3
Tip skiver	0.3
Stiffening skiver	0.1
Goodyear channeling machine	0.1
McKay channeling machine	0.1
Welt and turn machine	0.1
Fisher channel turner	0.1
Goodyear channel turner	0.1
McKay leaf turner	0.1
Tip turner	0.1
Leveler	2.0
Four-foot die press	2.0
Sole trimmer	1.0 to 3.0
Edge trimmer	1.0
Edge pricker	0.1
Single-edge setting machine	0.4
Union twin-edge setting machine	0.4
Eyelet machine	0.2
Buttonhole machine	0.1
Lightning heel-nailing machine	2.0
Mayo heel-nailing machine	2.5
Heel-trueing machine	0.3
Heel scourer	0.4
Heel burnisher	0.3
McKay heel trimmer	2.0
Pricking machine	0.5
Heel shaver	1.5
Sandpaper machine	0.1
Buffing machine	0.2

The input to electrical heating devices suitable for use in shoe factories is shown in the following table. Cleanliness, flexibility of use, safety, exact control of temperature, have all contributed toward the increasing popularity of these electrical devices.

Input to Electrical Heating Devices

	Watts.
Double shoe ironing tool	200
Shoe stamping machine	500
Flatiron	500
Single shoe ironing tool	200
Glue and wax pots	100 to 300

In the accompanying data sheets detailed information concerning the motor equipment of several typical plants purchasing power, are given.

New Edison District Office.

On January 26 the New York Edison Company opened a new district office at 151 East Eighty-sixth Street, one door east of Lexington Avenue. The space is divided between the district office and one of the regular company co-operative show rooms, in which manufacturers of electrical lamps and appliances exhibit free of charge. The show windows have the now familiar Edison stained-glass panels across the top, while the usual company sign extends down the front of the building.

The territory covered by the new office takes in the East Side streets from 60th to 109th inclusive, and includes all the avenues east of Central Park. Central Park itself, as well as Blackwell's Island, come within the territory. It was on November 1 that the new office was organized, with H. B. Skinner as manager. At that time, however, temporary quarters were provided at the 125th Street office while the new building was being remodeled.

Another Argument for Electric Heating of Churches.

In our issue of January 10, 1914, there appeared an editorial pointing out the value of electric heating of church buildings as an off-peak load, since it would be confined almost entirely to Sunday's in winter when the load on any central station is usually very low. Another argument for electric heating, and this one showing its value to the church itself, has presented itself by the serious damage from fire caused by overheated furnaces of two churches in Chicago on Sunday, February 8.

A cold wave during the freezing night had brought the outside temperature down to about minus seven degrees, Fahrenheit. In order to make the churches reasonably comfortable for regular Sunday services, the furnaces by which most of them are heated were forced to their utmost early on Sunday morning. The overheating thereby produced resulted in fire suddenly breaking through the floor of the auditorium in St. Chrysostom's Church and in the Church of the Annunciation. The former church was damaged to the extent of about $25,000. An explosion of gas drove the firemen from the structure and permitted the flames to get considerable headway. In the smaller church the damage was about $3,000. Fortunately there were few people in either church at the time, and these escaped without difficulty.

Such a disaster is quite liable to result in any church heated by a furnace. Aside from the life hazard to the congregation, a church fire produces a heavy additional financial burden to its building fund, and particularly when occurring on the Sabbath, furnishes material for agnostics and iconoclasts. With electric heating, on the other hand, the danger is reduced to a minimum, and convenience as well as ease of control, are perfected to the utmost. In fact, it permits dispensing with a janitor in smaller churches, where members of the church will frequently volunteer to assist in dusting and cleaning the premises.

Motor Vehicles in London.

In London, England, only six per cent of the passenger vehicles on the streets are horse-drawn. For all kinds of traffic, the percentage is 88, but it is steadily decreasing.

Commercial Practice
Management, Rates, New Business

NEW-BUSINESS METHODS FOR CENTRAL STATIONS.

By H. G. D. Nutting.

Methods of selling anything, whether it be kilowatt-hours or physical products, are practically standardized, that is, there are certain methods of procedure that always produce results. Central stations are just beginning to wake up to this fact.

Manufacturers and sales agents have realized it long ago and have sold their wares in this way.

There are practically three methods to be followed, all of which should be used and at the right time:

(1) Advertising; (2) personal appeals by letter and circulars; (3) personal appeals by agent. A campaign would include the use of all of these agencies.

Advertising should consist of, (a) liberal use of the newspapers with carefully prepared display copy. A series of ads to cover a long period with a definote object in view should be prepared. Spontaneous and single efforts are of no value. Street cars, bill-boards and signs should also be used liberally. (b) Circular letters covering one and only one subject, and supplemented by printed circulars. To produce the desired result it is necessary to send out three letters on each subject. The first attracts attention, the second holds attention and creates desire, the third encourages decision and inquiry, rendered easy by the use of the return postal card. (c) Inquiry should be followed by personal call and oral sales effort.

The purchaser cannot resist this "battering ram" of sales force.

One phase of sales effort should be concentrated on at a time, to

(1) Stimulate new commercial consumers.

(2) Stimulate new residence consumers.

(3) Stimulate new power consumers.

(4) Stimulate increased use by commercial consumers.

(5) Stimulate increased use by residence consumers.

(6) Stimulate increased use by power consumers.

Each of the above forms of new business should be worked by special concentrated effort and each campaign completely organized before starting it.

Before a new consumer campaign can be started an analysis of existing conditions should be made. This analysis should include in a card system a record of each premise in town whether it is on the lines or not, divided as to (1) those on the present lines and available without line extensions, (a) now connected, (b) not connected but wired, and (c) not connected and not wired; and (2) those off the lines, (a) not wired, and (b) wired.

The analysis should also include a calculation of the kilowatt-hours that could be sold yearly (based on present use), if every premise in town were connected and every power user were purchasing electricity. This figure divided into the annual present sales will give the present commercial efficiency. Reference to this figure from year to year will show what results are being accomplished. Subordinate commercial efficiencies can also be found by calculating the ratios of (a) commercial light sold to total available; (b) residence light sold to total available; and (c) power sold to total available.

Reference to these factors will show to what extent progress is being made in each division of sales.

A comprehensive monthly report of results should be made. This report should show:

1. Increase of consumers (number).
   (a) Commercial light.
   (b) Residence light.
   (c) Power.
2. Increase of connected load.
   (a) Commercial light.
   (b) Residence light.
   (c) Power.
3. Increase of kilowatt-hour sales (estimated and actual).
   (a) Commercial light.
   (b) Residence light.
   (c) Power.
4. Cost of advertising.
5. Salaries of commercial department.
6. Other costs of getting business.
7. Commercial efficiency of each kind of service.
8. Ratio of cost of getting new business to estimate gross business obtained.

The largest factor in getting new business (assuming service is good and rates are fair), is the personnel of the commercial department. The commercial department, besides looking after the increase of business, should look after complaints. Complaints should be adjusted promptly. It takes a good man, with broad experience, with human nature, an expert salesman, a good knowledge of the public-utility business, and a pleasing personality to keep the customers satisfied.

Every commercial department should be in charge of such a man. He should have enough help to plan and carry out the campaign above suggested. The cost of getting business is not so much the controlling factor as the ratio of the increased income to the cost. As many people should be employed in the department as the conditions warrant. When they stop producing results they do not have to be kept. It doesn't take long to determine when they stop producing.

Girls and young women make the best solicitors. They can get into houses and talk to the housewife where a man cannot. They can be hired for $25 to $45 a month and a commission. If each makes one sale or gets one connection contract a day, she pays for herself.

A campaign as suggested above, costs money. If the analysis of the field shows the business is there it is worth it. There is no use half doing it. The difference between the cost of getting business and the income from it may be greater in a "half hearted" campaign than in a strenuous one.

If houses are to be wired and connected some concessions on payments must be made. The new customer must be allowed a year to pay or some similar arrangements.

A contract can be made with some fixture house to furnish a group of good fixtures at a low price. The manufacturers will take care of part of the advertising and circularizing.

If new current-consuming devices are to be sold they must be placed on trial, and absolutely guaranteed.

If gasoline engines and other small power apparatus are to be replaced a fair trial proposition of a motor seldom fails.

Large motor business can be obtained only by careful engineering tests, and continuous diplomatic "hammering" on the prospect. It takes from six months to six years to get some of this business.

If the same methods are pursued in the central-station business as are pursued in other lines, a large amount of new business can be put on.

New "House of Edison Light."

As a means of demonstrating to the people of one of the older communities in Massachusetts served by the Edison Electric Illuminating Company of Boston the readiness with which an old house can be provided with electric appliances, that company has leased a house of this type, located on the main street in the suburban town of Arlington, seven miles from Boston, and has equipped it with electric lighting, heating, cooking, and other household apparatus.

Courtesy Edison Life

Electrical Equipment in Dining Room of House of Edison Light.

The company has restored the house to its original style by the removal of the modern, large-paned windows and the replacing of the many-squared sashes of the early days. Its exterior has been freshly painted in white, and a border of hedge placed around the narrow front lawn. An antique brick path and brick steps lead up to the fine old Colonial doorway. On the left of the path is the company's sign—"The House of Edison Light."

The interior has been renovated by the papering of the rooms with special old-time wall papers, and the furitnure and decorations are such as were in use a century or two ago.

The business office is at the left of the entrance, and here lamps may be exchanged, bills paid, and information secured by customers or prospective customers of the company. The drawing-room is on the right of the hallway, and back of this is the dining-room and in the rear the kitchen. These rooms are furnished with lighting, heat-radiating, cooking, sweeping, and other devices, appropriate to their use, in much the same manner as the company's other "houses of Edison light."

The bedrooms upstairs are equipped with electric radiators, warming-pans, curling irons, etc., and the model bath-room is furnished with all the electric health and comfort devices known.

The rooms not open to the public are used by the man in charge and his family. The office is open from 8:30 a. m. to 6:30 p. m. daily, and until 9 p. m. Saturdays, while the remainder of the house used for display is open for inspection from 9 a. m. to 5 p. m. and on Saturdays until 9 p. m. A young woman is in attendance as demonstrator.

The residents of Arlington are showing great interest in the attractive display and its setting. About 350 people visited the house on the opening day.

Courtesy of Edison Life

Model Bedroom in House of Edison Light, Boston.

Safety-First Campaign in New Albany.

The United Gas & Electric Company of New Albany, Ind., has decided to take up a "Safety-First" campaign, and a meeting has been called for February 27 to consider the matter. James Harmon, safety agent of the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Light Company, will be in charge of the meeting. The two companies last named operate interurban lines and have greatly cut down accidents during the past year through a similar campaign.

Guessing Contest.

The Rockingham County Light & Power Company, Portsmouth, N. H., is attracting the interest of the children of that city in electrical matters by displaying an enormous pile of incandescent lamps in its show window and offering to present a set of toys operated by electricity to the boy or girl who guesses nearest to the correct number of units.

Reduced Rates on Coast.

The Southern California Edison Company has filed a schedule of the reduced rates with the state railroad commission in San Francisco, to become effective March 1, 1914.

Electric Sign Data

A Striking Transparent-Glass Electric Sign.

A most remarkable electric-sign effect has been recently introduced in Great Britain by the Diaphanad Patent Electric Signs firm, of London. Until the method of working is explained it produces an effect which is almost incomprehensible. This sign consists of a sheet of ordinary clear plate glass, mounted in a polished brass tubular frame, and with the exception of the lettering upon it, the glass is perfectly transparent. On the back of the glass is engraved the required lettering forming the advertisement, and this lettering is visible in ordinary daylight as frosted-glass lettering on a clear background.

At night, however, these letters appear to glow with light in an extraordinary manner, and at first the method of their illumination is difficult to understand, as no light-source whatever is visible. The secret of the sign is that in the upper and lower portions of the tubular frame, Striplite metal-filament lamps are concealed, from which the light passes out through the slits in the frame into which the glass fits. In this way the light is concentrated in the body of the glass alone, no light escaping the surface of the glass, but where the light encounters the inner surface of the frosted surface, an illumination effect is set up in the frosting which gives a most brilliant and remarkable appearance to the letters and by using colored lamps some very pleasing and effective gradations of tints can be produced.

Another advantage is that the glass can be very readily changed, giving a change of reading matter. Four outdoor service signs in water-tight frames can be constructed to read on both sides, if required. In the indoor sign its transparency is an advantage, as it does not in any way obstruct the view of goods exposed for sale in the window.

An illustration of the sign would fail to give an adequate idea of the effect produced, but it will be seen from the above that a very novel and original form of electric advertising has been developed.

Here is a suggestion for an electric sign for a theater originated by the Greenwood Advertising Company, of Knoxville, Tenn.

The sign as constructed for the Rochester Theater measures 12.5 feet long and 4.5 feet high. There are 114 receptacles, the sign being equipped with double-face 16-inch raised fancy, full-block electric letters.

Any color scheme desired can be provided for such design, the background in the particular sign illustrated being imported glass, smalt. A verde antique border with this sign makes a very attractive combination.

No flashing effect was provided for in the Rochester sign, but the addition of such equipment would not materially increase the cost of the sign.

The price of the sign is $129.50 double-faced; and $75 single-faced, complete with hanging rig.

Big Electrical Display for Seattle.

One of the most expensive electric signs on the Pacific Coast is now being erected on the Eitel Building, Seattle, for the United Advertising Sign & Novelty Company. It is a combination sign 60 feet by 36 feet, divided into sixteen spaces, for as many different advertisers, each paying $60 per month for the display.

The Federal Motograph is being used, and the frame was built by the San Francisco office of the Federal. Mr. Welling, of the Federal, is personally superintending the erection of the sign.

The sign blankets the busiest corner in Seattle, and the company operating it had no difficulty whatever to dispose of each one of the sixteen spaces.

It is pretty good evidence, says *Signs of the Times*, that electrical advertising is popular on the Coast.

In Colorado, the City of Trinidad has selected a slogan reading, "Trinidad, The Town To Tie To," which will be advertised by means of an attractive electric sign forming the letter T.

The sign will be 8 by 10 feet and 466 five-watt lamps will be used. It will be hung on an ornamental arch in the center of Commercial Street Bridge, showing North and South.

The color effect will be an old-gold rim, green background, white lights for letters and red lights for rim, with suitable flashing effect.

The sign is being constructed by the Trinidad Ad-Sign Company.

Electrical Construction

The Fight on Old-Code Rubber-Covered Wire.

The danger both to life and property from defective insulation of electrical wires has been known a long time. The movement for improving the standard of insulation was taken up many years ago and one of its most important steps was the laying down of higher specifications for rubber-covered wires that was announced in the 1911 edition of the National Electrical Code. The wire made in accordance with these new specifications is usually known as new-Code wire, as contrasted with the former material, which is known as old-Code wire and by many is even called no-Code wire because it does not even come up to older Code standards. Most of the electrical inspection departments throughout the country required that nothing but new-Code rubber-covered wire shall be installed after April 1, 1912, or at the latest July 1, 1912.

Although the cost of the new wire is but a trifle, usually not over five per cent, higher than that of the old-Code wire and despite the fact that manufacturers and dealers had ample time to dispose of old stocks, more or less of the old-Code wire is still being sold and it is believed is still being surreptitiously manufactured by some unscrupulous manufacturers, who are more intent on the quantity than the quality of their product. This condition is bringing about concerted efforts on the part of all interests seeking improved construction and minimization of hazards to debar effectively and drive out entirely the use of rubber-covered wire not up to the new Code standard.

At the convention of the Western Association of Electrical Inspectors held in Cincinnati two weeks ago, as narrated in our last issue, this matter came up in a forceful report of the Committee on Rubber-Covered Wire. This committee was composed of Victor H. Tousley, of Chicago, chairman, L. A. Barley, H. M. Maxwell, C. L. Reasoner, B. O. Boniface, W. I. Stone and F. D. Varnam. This important report was prepared by Chairman Tousley, who is chief electrical inspector of the City of Chicago. The report is reproduced in full below.

At the meeting of this Association held one year ago, the Committee on Rubber-Covered Wire did not make any formal report as many of the inspection departments were busily engaged in applying the new National Electrical Code specifications and the rubber-covered wire field had not settled down to a point where even a vague estimate of the actual conditions could be determined. However, during the past year practically every inspection department in the jurisdiction of this Association, which had not previously done so, took action, and, as far as I can ascertain, there is not a section of the country where new-Code wire is not now required.

I believe we are all to be congratulated on this condition and the only regret is that it did not occur ten years or more ago. A chain is only as strong as the weakest link and, in so far as materials and devices are concerned, I believe the rubber-covered wire has been the weakest link of our electrical wiring system. I look forward to the time when the breaking down of the older electrical installations will start, as there is bound to be an epidemic of trouble when the defective and—I know of no better word to describe it—rotten insulation of a few years ago begins to give way. If our stand today is correct, and an electrical installation to be safe requires a rubber-covered wire of the present standard, what about the old-Code installations?

However, today we are not so much concerned with what has gone by us, but the problem now is how to eliminate entirely the use of old-Code wire. Old-Code rubber-covered wires persist where inspections are lax and they persist where inspections are rigid. The market is flooded with inferior insulations, quality is eclipsed by price. Cheap contractors are easily urged by energetic salesmen to buy these goods, the main consideration being the extra discounts. There are rubber-covered wire factories that stand ready to manufacture and sell in any amounts old-Code rubber-covered wire. The public, however, expects a fair deal and is entitled to it.

In order to get information on the rubber-covered wire field today, I sent out a number of circular letters requesting information on the use of rubber-covered wire. In this letter the question was asked as to what percent of the wire coming into the territory was new-Code. With few exceptions, the reply was 100 per cent. However, I have information that in one of these territories some thirty or more thousand feet of old-Code rubber wire had been recently shipped. I do not call attention to this in any spirit of criticism, but simply with a desire to bring to your attention the fact that as an Association we should make an added effort to entirely eliminate old-Code wire from the field of electrical installations.

I do not know what the experience has been in other cities, but in Chicago we have found that the principal offenders at the present time are among the fixture supply dealers and manufacturers. This especially applies to makers of portable lamps. It is somewhat surprising, when you come to consider the fact that the cost of the rubber on a standard fixture wire or flexible cord is so small a per cent of the total cost of the fixture, that there should be any trouble from this source, but it will show you that even the smallest profit is considered today; and, if a profit can be gained by the fixture manufacturer on this small investment, why should not the contractor, who uses a great amount of rubber-covered wire, attempt to get away with his share.

The case of the fixture man is still more important when the question of safety is considered. The wire he uses is of small insulation. It is pulled into fixtures around sharp bends and over corners and generally abused. Yet, what is more dangerous from a life standpoint than a grounded fixture. Deaths are occurring with great regularity from shocks from 110-volt systems.

Another cause for the use of old-Code wire is the great competition among the smllaer, or what are commonly known as grip-sack contractors. This competition is greatest among the smaller sizes of wires, for such are mostly in demand and the least capital and equipment is required for their installation.

The accepted standard is defined in the National Electrical Code, factory inspection is provided and the inspection tag must be supplied with every coil. Why then the low-standard product?

The defect in the system is that the factory-inspection service is not clothed with sufficient authority. Its main weakness is that it is incomplete. Tagged coils, below standard, do get shunted past the inspector. The manufacturer is advertised as a maker of approved wires and a definite market is listed for his product Now, the procedure in some factories, at least, is for the inspector to test that part of the product which is submitted to him and all that he rejects as unfit goes to market right along with the rest. But the inspector is not allowed to consider at all that part of the product which is not submitted for test and which is sent to market without the inspection tag, as "Not Code" and to be "bought on purchaser's responsibility."

For example, a manufacturer advertises in large capitals "(Jones) New Code Rubber-Covered Wires and Cables Meet Every Requirement—Prices and Quality Always Right."

When the inspector sees this factory's product on the job, it is the opposite of the material that is advertised. Why should the laboratory in-

spector at the factory not be allowed to test the entire product of that factory? Why should not this inspector be given authority to demand the destruction of all wire not meeting the specifications? Why should not the laboratory refuse inspection service to any manufacturer making wire which does not meet the new-Code specifications?

What becomes of this old-Code and this defective wire? Is not every foot of it used in wiring buildings throughout this country? Are not the insurance companies carrying risks on practically all of these buildings? Are not all the buildings inhabited by human beings whose lives are in constant jeopardy through possible fires? If these are not facts, why are we requiring new-Code wires today?

I believe this Association should go on record now as recommending to the Underwriters' Laboratories that label service be refused to any factory manufacturing old-Code wire, and I further believe that the large majority of the rubber-covered-wire manufacturers would welcome this action.

What excuse is there for the manufacturer of old-Code wire? It is a deception pure and simple and no legitimate excuse of any kind can be offered for its existence. A jobber when asked why he sold these goods replied: "Yes, we have to beat people, we need the money." This occurred in an interview when a contractor returned old-Code wire which had been billed as new-Code. This accidental mixing of stocks happens very often.

Another case of the kind was when on complaint the stock of a fixture shop was examined and found correct. The inspector on the job where the fixtures were installed insisted that he knew old-Code when he met it and the contractor declared that he had not bought or used old-Code, but was using the (Jones) new-Code, meets every requirement, etc. He objected to the inspector's decision and the wire tester, inspector and contractor went to the job together, when the contractor was the first to pronounce the wire in question to be old-Code.

Coils not supplied with genuine factory-inspection tag should not be accepted. The wireman will do well to examine a sample from every coil. The tiny marker bears its own story of character. The stretch tests are easily made and fortunately are often decisive. The entire insulation rather than a segment is best to use. In the field, tensile strength can be approximated by comparisons obtained by practice. Centering is essential and is easily noted at several points along the wire. A poorly centered wire after immersion often breaks down on test at service voltage. Decentralization becomes relatively more important with decreased thickness of wall.

The thickness may be accurately determined by the micrometer and the standard here as elsewhere should be the full required amount. Wires short on thickness are abundant. The conductor area should be checked; omission of one or two strands in cords is quite common.

Insulation resistance, voltage test, breakdown and chemical tests require equipment but results obtained well repay the expenditure and time.

Samples for check tests may be forwarded to the Underwriters' Laboratories and are reported free of charge. This service is not so well known and utilized as it deserves to be.

The Laboratories' factory-test-service bulletin contains a wealth of information on methods. Systematic testing and test records should be a part of the inspection service everywhere. Printed forms can be quickly filled out and when filed are of value for permanent reference.

In our own laboratory during the past year we have tested more than 600 samples of all sorts and sizes of wires and cables, with the result that many cases of wires below standard have been proven and the defective wires removed.

Is the standard for rubber-covered insulation too high? Not when the compound partly consists of only 20 per cent of rubber which may have already outlived many successive reincarnations in the form of hot-water bottles, overshoes and door-mats.

Louisville Contractors Meet.

The annual meeting of the Louisville Electrical Contractors' Association was held at the Henry Watterson Hotel on February 3, officers being elected as follows: C. C. Childers, Childers & Waters, president; Herbert Ottenheimer, Home Electric Company, vice-president; Gus Albrecht, Albrecht Hardware Company, secretary, and James Clark, Jr., James Clark Jr. Electric Company, treasurer. The retiring president was Frank Good, of F. A. Clegg & Company. The contractors are endeavoring to have an arrangement made whereby the Kentucky Actuarial Bureau, the fire underwriters' organization, will handle all inspections of electrical installations in Louisville. The work is at present done partly by the city and partly by the Bureau. The latter's operations are on a fee basis, but it is hoped to make a satisfactory arrangement which will enable the underwriters' service to be secured.

Among the Contractors.

The Harry I. Wood Company has the contract for the installation of 25 motors in the plant of the Lanham Hardwood Flooring Company, Louisville, Ky.

Herbert S. Potter, Boston, Mass., electrical engineer and contractor, has removed to 238-240 State street.

V. M. Nussbaum & Company is the new name of a concern doing electrical contracting in Fort Wayne, Ind. This company also deals in machinery. It formerly operated as the electrical department of the Hanna-Brackenridge Company, which is no longer in exisence.

The James Clark, Jr., Electric Company, Louisville, Ky., has the contract for the installation of electric wiring in the city workhouse of Louisville; also for the installation of 25 motors in the organ manufacturing plant of Henry Pilcher's Sons, which is changing from direct to alternating-current motors.

Specification for Rubber-Insulating Compound.

A demand for specifications which will enable purchasers of rubber insulation to secure good material on the basis of competitive bids has existed for many years.

In recent years, there has been no difficulty in securing insulation having the dielectric strength, specific resistance, elasticity and mechanical strength required in practice. Indeed, with the possible exception of dielectric strength, these qualities are often in excess of actual service requirements. There is another quality, namely, permanence, which although equally essential, has not been so easy to obtain.

While the physical properties of rubber insulation are susceptible of positive determination by tests which can be made before acceptance by the purchaser, the permanence of insulation can be ascertained only in practice, often at a great loss, inconvenience and danger. It should, therefore, be the aim of specifications to overcome this difficulty and by some direct means ensure that the manufacturers supply compounds having the required endurance.

This obviously presents a difficult problem, as it requires that some relation be established between permanence and one or more of the properties which are susceptible of test.

A committee was appointed by a group of manufacturers and users of rubber compounds in 1911 to draw up a set of standard specifications which would be acceptable, covering the requirements of rubber used for insulating conductors. The conference at which the committee was appointed and to which its report was submitted consisted of representatives of the following: United States Signal Corps, United States Bureau of Standards, American Chemical Society, Lederle Laboratories, New York Central Lines, Pennsylvania Railroad, General Electric Company, Hazard Manufacturing Company, Simplex Wire & Cable Company, Standard Underground Cable Company. This committee has submitted a report which has been published in the Proceedings of the American Institute of Electrical Engineers for January, 1914, from which report this excerpt is taken.

It is pointed out by the Committee that it is desirable, where the greatest durability is to be insured, that the grade of rubber should be a fine Para, or a plantation rubber of good grade which is practically indistinguishable from it by chemical tests when compounded. The specification is drawn up, however, for Hevea rubber, which

may be specified to advantage since it includes Para rubber and will be generally satisfactory for most purposes.

Most high-grade rubber compounds for insulating wire are prepared by mixing rubber gum with sulphur and mineral or organic fillers, such as paraffine wax, ozokerite, ceresine, zinc oxide, talc, whiting, litharge, barium sulphate, and basic lead sulphate.

Among the qualities affected by the grade of rubber and said to be indications of the presence of Para rubber are the tensile strength, elasticity, and specific resistance. Experience has shown that specifications in which one or more of these qualities is specified in an exaggerated degree are ineffective. Specifications based on physical tests alone have fallen into disrepute and such tests should be only adjuncts to chemical tests. Three difficulties arise in the specification of chemical composition: chemical analysis cannot directly ascertain the quality or quantity of rubber in a compound; chemists have employed diverse methods of analysis which give inconsistent results; analytical results are not always interpreted uniformly.

The specification drawn up by the Committee is as follows:

(1) A 30-per-cent fine Para or smoked first-latex Hevea rubber compound with mineral base, shall be furnished. It shall contain only the following ingredients: rubber, sulphur, inorganic mineral matter, refined solid paraffine or ceresine.

(2) It shall not contain either red lead or carbon.

(3) The vulcanized compound shall conform to the following requirements, when tested by the procedure of the Joint Rubber Insulation Committee.

(a) Results to be expressed as percentages by weight of the whole sample:

	Maximum	Minimum
Rubber	33	30
Waxy hydrocarbons	4	..
Free sulphur	0.7	..

(b) Results to be taken between the limits given in proportion to the percentage by weight of rubber found:

LIMITS ALLOWED FOR 30-PER-CENT RUBBER COMPOUND.

	Maximum	Minimum
Saponifiable acetone extract	1.35.	0.55
Unsaponifiable resins.	0.45	....
Chloroform extract	0.90	....
Alcoholic potash extract	0.55	....
Total sulphur (see note 2)	2.10	....
Specific gravity	....	1.75

LIMITS ALLOWED FOR 33-PER-CENT RUBBER COMPOUND.

Saponifiable acetone extract	1.50	0.60
Unsaponifiable resins.	0.50	....
Chloroform extract	1.00	....
Alcoholic potash extract	0.60	....
Total sulphur (see note 2)	2.30	....
Specific gravity	....	1.67

(4) The acetone solution shall not fluoresce.

(5) The acetone extract (60 cubic centimeters shall be not darker than a light straw color.

(6) Hydrocarbons shall be solid, waxy and not darker than a light brown.

(7) Chloroform extract (60 cubic centimeters) shall be not darker than a straw color.

(8) Failure to meet any requirement of this specification will be considered sufficient cause for rejection.

(9) Contamination of the compound, such as by the use of impregnated tapes, will not excuse the manufacturer from conforming to this specification.

Note 1. This specification shall be supplemented by appropriate clause relating to tensile strength, elesticity, insulation resistance and dielectric strength.

Note 2. The limit on total sulphur may be omitted at the option of the purchaser.

The report states that experience has shown that compounds which upon analysis show the characteristics of good Hevea rubber may be relied upon to be more permanent than those made of rubber of other grades.

This specification requires a much higher grade of product than the specifications of the National Board of Fire Underwriters, as revised in 1911.

In the above specification carbon is excluded because it is considered by some to be deleterious. Red lead is excluded because of possible deleterious effects on the rubber. An upper limit is placed upon the rubber in order to prevent the attainment of electrical and mechanical strength by the use of an extra quantity of inferior rubber whose lasting qualities might not be satisfactory. For further details the reader is refered to the full report, which gives the details of procedure in making a test.

This specification has already been adopted by the Association of Railway Electrical Engineers, and it has been recommended by the Power Distribution Committee of the American Electric Railway Association.

How the Faraday Association and the Edison Company Co-operate

The spirit of co-operation between the electrical contractors and central stations, which has been growing rapidly in recent times, has been made evident between the Commonwealth Edison Company and the Faraday Electrical Association in Chicago.

The Faraday Electrical Association is made up largely of electrical contractors in Chicago who are engaged in the work of wiring apartment houses and residences. For many years the Commonwealth Edison Company has been offering the owners of old houses a proposition by which the house will be wired for electric lights and payment made in monthly installments, extending over a period of two years, these payments being included in the monthly bills for consumption of electricity.

An arrangement has been made by which similar wiring may be done by the contractors in the Faraday Electrical Association and the same terms offered to house owners as by the Edison Company. Prices for this work are computed by the contractors on the same basis as by the Edison Company, and when a contract is secured the work is done by the contractor, who is paid by the Edison Company, and the latter collects from the customer in monthly installments just as if the work had been done by its own wiremen.

Fig. 2 shows the folder which is mailed to prospects by the contractors coming within the scope of this arrangement. It includes at the bottom a detachable post card containing a request for further information and an estimate of the expense involved. The other side of this card has the printed name and address of the contractor

It Surprises Nearly Everyone

To Know How Little Fuss or Muss Our Workmen Make When Wiring Houses for the Use of Electric Light

All Work Guaranteed by This Association

Almost anybody can run wires. Putting them back of tinted walls without marring the plaster—under polished floors without leaving a trace of the work—is another thing. Our workmen have demonstrated their ability to do this many times. They are not experimenting on **your house.**

We Wire Your House----Two Years to Pay

Fig. 1.—Portion of Folder for Wiring Old Houses.

We Wire Your House Without Injury to Walls

OUR workmen don't tramp in mud, knock dents in furniture and tear holes in your plaster. They work quietly, quickly, with as little dirt as possible. You would hardly believe that so little is possible until you see them at work. The only evidence that our workmen leave after them is the great convenience of Electric Light and Electrical Appliances.

Let Us Tell You How Little It Costs, and—Two Years to Pay

The economy of this clean, convenient light is its most notable feature. Electric Light rates have been repeatedly reduced. It saves decorating costs, modernizes the home, and provides a means of doing many tasks about the house. Electric washing and electric ironing save steps and labor. Our liberal plan makes it possible for you to enjoy the advantages of Electricity in your own home, with very little effort.

DETACH THIS CARD AND MAIL IT TODAY

ELECTRIC LIGHT

MAKES HOME BRIGHT

REQUEST FOR ESTIMATE

Chicago,_____191__

Please have your representative call upon

Name _____

Address _____

Telephone _____

and estimate the cost of wiring the _____ story { residence / apartment

located at _____ Street

for the use of Electric Light.

Fig. 2.—Folder Sent Out By Faraday Electrical Association.

sending out the folder. Another section of the rear of this folder contains the inscription shown in Fig. 1, A third section contains the name and address of the particular contractor who is sending out the folder, and the fourth is left blank for addressing to the prospect.

This campaign has been very fruitful and is bringing a great deal of work in the line of wiring old houses to the contractors at a time when work upon new buildings is especially dull. The prices are such that a fair profit is earned by the contractor. Business can be secured upon the same terms as by the central station and all friction with the latter has been eliminated.

New Jersey Contractors Meet.

The annual meeting of the New Jersey Electrical Contractors' Association was held at the Ridgeway Hotel, Delaware Avenue and Market Street, Camden, N. J., on Saturday, January 24, and was one of the most successful meetings ever held by the Association, although the weather was unpropitious, there being a downpour of rain from morning until night.

The session was called to order by the president, E. P. Strang, of the Strang Electric Company, who stated in his address of welcome that the electrical contractor of today was not the electrical contractor of the past, who had his office in his hat, and every time his hat blew off he changed his place of business. Such contractors as those made it hard for the legitimate contractor, one who wished to do business on business principles, but had a hard time doing so on account of the methods employed. The contractor of today is one who wishes to get acquainted with the inspector, not run away from him, but to have confidence in him, so that the inspector will return the compliment. What is needed most today is a get-together plan, one that will bring all classes of electrical contractors together. As a rule an electrical contractor is afraid to get acquainted with his competitor and will not join associations, but wants to reap any benefit that may be derived from such associations. The National Electrical Contractors' Association has been of much benefit to its members; its committees have worked to perfect the salesbook and further numerous other points; and it is a benefit to the electrical trade in general. The electrical contractors of New Jersey should join the New Jersey Electrical Contractors' Association and get acacquainted with their competitors and become familiar with the work the Association is doing.

A communication was read from the New Jersey State Federation of Wom-

en's Clubs calling attention to the general complaint of housewives that their kitchens are inconveniently arranged, resulting in an unnecessary expenditure of energy and time in doing their work. The Federation was anxious to know whether the Electrical Contractors' Association gives any special attention to the convenience and ease of the woman worker in such matters as the placing of lights, location of outlets, etc.

Secretary J. Van Dyke had replied, stating that the Electrical Contractors' Association had taken up the question of the electrical equipment of the home with the idea of equipping same for the convenience of the inmates, and sending a booklet entitled "Electrical Equipment of the Home."

After the regular routine of business the president introduced Arnold H. Moses, architect, who gave an address on "The Architect and the Electrical Contractor."

Architect and Contractor.

Mr. Moses said that the question of how to get the best results is a vital one to the architect, for a good piece of work well done is the best advertisement he can have; so for his own protection, as well as for the owner's benefit, he must continually strive for the best in all the branches of construction with which he has to deal. It is common belief that the practice which until recently has been almost always followed, of having a general contractor and subcontractors for the different parts of the work is not conducive to the attainment of this ideal.

Now the work of the electrical contractor is of a special kind. It is necessary that the person installing it shall have some knowledge of the subject with which he is dealing and of the variety and kind of appliances available and suitable for the installation of his work, and, consequently, in his work the money consideration should never be the only matter considered.

The reasons which I think led to the grouping together of a number of subcontractors and making one contract with a general contractor was the desire to have some one contractor responsible for the whole work, who should engage to see that each part was executed properly and who should be able to control the craftsmen on the job and, on completion, deliver up a completed job to the architect and owner for a certain stipulated sum. The public is gradually realizing that better work can be had, at very little, if any, more expense, by having the architect in full control and making through him separate contracts for each part of the work and paying one contractor a little more money to take general oversight of the work under the architect and see that all details are completed.

It is obvious that an architect cannot master all the details of the electrical contractors' work, and the best practice is, when he has an important building to undertake, to consult with experts in every important branch, as by so doing he will get in touch with the latest appliances and will be able to prepare the drawings and specifications so that there will be no trouble in understanding them and getting reliable estimates; as it goes without saying that a carefully prepared set of plans and specifications in which nothing is left to the imagination will give the owner what he wants at a reasonable figure and the contractor will be able to figure a profit. The architect also will feel that the result of his labors has been attained in the best and most efficient manner.

The general contractor is not expected to know about electricity, so why should he employ the electrician, and why should the owner pay a profit to two parties, the electrical subcontractor and the general contractor, who is supposed to shoulder all responsibilities, but who generally only gets estimates for the wiring and sublets it for the smallest amount possible after the contract is awarded to him, leaving to the architect most of the trouble of seeing that the subcontractors live up to their contracts.

Since the work of the electrical contractor has assumed such importance, and since there are in many places associations of master electricians, it has been suggested that it would be wise for each association to have a committee of experts, upon whom the architects could call for advice, and to state in an impartial way whether the electrical contractor had fulfilled honorably and fairly the terms of the contract, or whether he had slighted the work. This committee should be composed of men who would render a fair and just decision in the various cases that might come before them for their action. Then in the event of the committee finding that the electrical contractor was doing "shoddy" work, he should be amenable to punishment in some way, and, if severe treatment was necessary, possibly expelled from the association. When the architects and good builders found that the association stood only for straight, honorable and efficient work and that the dishonest practitioner would have no place in its ranks, then a membership in such an association would be of great value to its members and to the public.

It has also been said that in a large city such an organization could save vast amounts in the following way: Almost every manufacturer sends out samples of the goods he has to sell to the architects, who, in a great many cases, promptly lose them; and when they find them again wonder what on earth they are for, as the literature that came with the samples has been relegated to the waste basket.

If the association could arrange to receive samples and to classify them, the architects would get in the habit of visiting its headquarters from time to time for the purpose of education. The manufacturers could be sure that their samples were not either stowed away in a cupboard where they could not be found, or lost entirely.

The time of the specialist has come in every walk of life, and the expert electrical contractor is a specialist, and in most cases it is better to have him do his work as a separate and independent contractor and not as a subcontractor.

After Mr. Moses' address a recess was declared and the manufacturers and jobbers were admitted. After the usual greeting the president introduced E. Ward Wilkins, of Patrick, Carter & Wilkins Company, who gave a very interesting talk on conditions as they were in time gone by and as they are today.

J. P. Alexander, of the General Electric Company, gave a descriptive talk on equipment of the Thomas Maddock Sons' Pottery, of Trenton, N. J., with motors for direct drive, which will make a saving over steam both in cost of operation and in labor.

After a number of manufacturers and jobbers had spoken upon the good the New Jersey Electrical Contractors were doing, the president introduced Farley Osgood, of the Public Service Company, of New Jersey, who gave an interesting talk upon the attitude of the Public Service Company toward the electrical contractors. Mr. Osgood was followed by Messrs. Vanderpool, Sawin, Pemberton, Harbison, Cox and Young, all of the Public Service Company.

Mr. Gaffrey gave a very interesting talk upon municipal inspection.

Mr. Dorris, of the Underwriters of the Middle Department, gave a very interesting talk upon the relation of the inspector toward the electrical contractor.

J. W. Kelley, chief of the Electrical Bureau of Camden, explained the law requiring electrical contractors to register and take out a license and pay a fee of $25 before doing work in Camden, N. J.

At 7 p. m. a banquet was served, after which the following officers were elected:

President, E. P. Strang, Camden, N. J.

Vice-president, Charles Newman, Passaic, N. J.

Secretary, J. Van Dyke, Asbury Park, N. J.

Treasurer, P. H. Jaehnig, Newark, N. J.

Board of Directors—J. T. Plaskett, Merchantville; S. H. Smith, Trenton; Carl F. Adams, Trenton; R. P. Ward, Dover; R. McGown, Newark.

The next semi-annual meeting will be held in Long Branch, N. J.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Connecting Flat-Iron Cords.

It is sometimes difficult to replace an asbestos cord on a heating device when the cord has to pass through the spring so often used to prevent the cord from kinking at the connection. This is easily accomplished by working the outer cover back, as shown in Fig. 1, then cut off the individual wires at the outer covering and pull the braid forward again, as shown in Fig. 2. A string can now be

Figs. 1 and 2.—Asbestos Cord.

tied and as the cord has a smooth tapering end it can be pulled through any type of fitting.

Charles E. Hanny.

Finding Concealed Boxes.

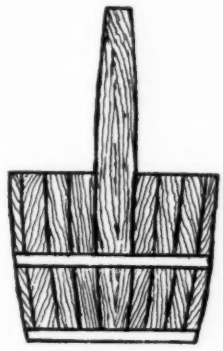
Having to install some flush switches in a new house that was wired with knobs and tubes, I found that the masons had pushed the wire into several of the boxes and filled them with plaster. The walls being prepared, of course, I had no way of knowing the location of the switches, but found them by taking a pocket compass and moving it along the wall about four feet from the floor. When the compass came near a switchbox the needle was moved toward the box, and I had no trouble in finding the switches in this way.

E. L. Ward.

Receptacles for Small Parts.

On most roughing-in jobs the wireman will find that to have his material segregated will not only save time but will enable him to keep track of his material and prevent a shortage of some item which might be neglected if not kept separately.

The best and most easily procured receptacle that I know of is a 100-pound nail keg sawed through the middle save for one stave, as shown in the accompanying figure. This one stave acts as a handle and makes it possible to carry considerable weight with one hand—more than would be possible if it were placed in a box. On large jobs I usually have



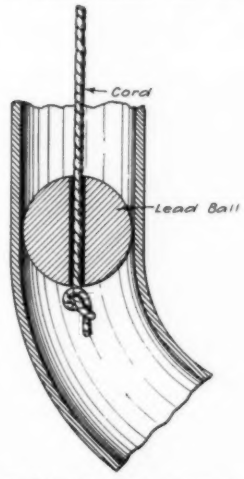
Basket for Small Parts.

four of these kegs; one for solid knobs, one for split knobs, one for three-inch bushings and one for four-inch and six-inch bushings.

Robert Oster.

Pulling Wire Through Fixtures.

The best scheme I have ever used for pulling wire through fixtures is to start with a small thread or cord attached to a lead ball, as shown in the figure. The hole is easily made by drilling, or, if sufficient care is exercised, a steel needle can be driven



Fishing Through Fixtures.

through. Make the knot as small as possible so that the cord will not catch ahead of the ball. After the cord is pulled through, the remainder of the operation is easy.

N. G. N.

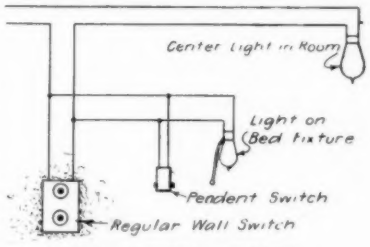
Fishing in Partitions.

Secure a small piece of sheet lead and cut it into strips about one-half inch in length. Roll these strips, eight or nine in number, around a string, leaving a space of about one-eighth inch between each piece of lead and the next, and you have as good a partition fishing tool as can be had. The spaces between the pieces of lead cause the entire affair to be very flexible and it will find its way through almost any opening in a partition.

William E. Rhodes.

A Bedroom Light.

It is often desired to have a dim light in a bedroom, and it can be arranged as follows: In multiple with the regular room switch on the wall is run a cord to any suitable form of bed bracket, upon which is mounted a lamp with a half-shade and pull socket. From this bracket is hung also a pendent switch, the operation being that when the pendent switch is "on," the ceiling light in the room is bright or up to full candlepower; when this switch is "off" and the pull socket on the bed bracket is "on" the two lamps will burn in series and give a nice soft light all over the room; when the pull



Wiring for Bedroom Light.

socket is "off" all lamps are out. This arrangement is very handy as it places the switches right where wanted in bed. We use the dim light more than the bright. This rig can be easily applied to any existing installation. It cannot be quite appreciated until seen in operation, and it is something that can be readily gotten up in any contractor's shop. It is one of many little conveniences that find a sale when they are shown and demonstrated. We have sold a number of them and always have one on display in our show room.

E. M. Raetz.

How to Keep Hacksaw Blades.

Much unnecessary annoyance and breakage of blades can be avoided if a receptacle such as described in the following is made in which hacksaw blades may be kept. It is to take a piece of fixture tube of suitable diameter and in length about one inch longer than the blade it is desired to hold; then cut a disk of sheet metal which, soldered on one end, forms a bottom. To complete the device solder a disk of sheet metal on the end of a ((brass-tube) coupling; then, one end of the fixture tube being threaded, this may be used as a cover.

William A. Murray.

Public Service Commissions

CALIFORNIA.

The California-Oregon Power Company applied to the Commission for permission to establish its regular rates for electric service supplied in the town of Sisson and vicinity. A former order had granted the company permission to purchase the electric property subject to the provision that the transfer shall not be used to increase any of the rates charged to the patrons of George H. Johnson, the former owner. The rates proposed by the applicant have been accepted by the town of Sisson and the present order of the Commission accepts these rates, permitting the previous order to become effective.

ILLINOIS.

The Commission has appointed Everett Jennings counsel to the Commission. Mr. Jennings is a graduate of Central University, Danville, Ky., in 1896, and in that year was admitted to the bar and practiced in Kentucky until 1908. Since then he has practiced in Chicago. In 1912 he was assistant state's attorney of Cook County.

MASSACHUSETTS.

A hearing was held by the Massachusetts Legislature Commitee on Public Lighting, February 6, on a bill now before the Legislature which aims to put the control of rates for electric energy under the jurisdiction of the Gas and Electric Light Commissioners. Advocates of the measure urged that a flat rate be established for electricity throughout the State. W. R. Peabody, representing the Easthampton Gas Company, and the Turners Falls Company, and Everett W. Burdett, representing the Massachusetts Electric Light Association, opposed the bill.

NEVADA.

The State Public Service Commission has reduced electric light and power rates in southern Nevada from 5 to 50 per cent and cut the meter deposit from $10 to $5, effective March 5. The lines are owned by the Nevada-California Power Company.

NEW HAMPSHIRE.

The Public Service Commission has issued an order authorizing the Fall Mountain Electric Light Company, of Bellows Falls, Vt., to transfer to the Fall Mountain Electric Company, a Massachusetts corporation, the electric lighting properties located in the towns of Walpole, Charlestown, Alstead and Langdon, N. H., at the purchase price of $17,000. The transaction is a result of the Massachusetts law which taxes stock in foreign corporations, recently declared valid by the United States Supreme Court. The Fall Mountain Electric Light Company was a Vermont corporation having a generating plant at Bellows Falls which supplied current to towns outside that state as well as to Bellows Falls. The stockholders formed a new corporation in Massachusetts which acquired the Vermont property and is now authorized to take over the property located just across the Connecticut River in New Hampshire.

The Commission has granted the petition of the New England Telephone and Telegraph Company for pole rights over private lands in Rochester, Brookfield, Milton and Madison.

The Commission has authorized Robert A. Ware to operate an electric utility in West Wilton.

The Public Service Commission has refused to approve an issue, by the Grafton County Electric Light & Power Company, of $300,000 stock and bonds for the purpose of purchasing lighting companies in Lebanon, and Hanover, N. H., and Hartford, Vt., on the ground that the financial aspects of the proposed issue were contrary to the public welfare. The properties to be acquired have now a capitalization of $13,000, and the Commission holds that the profit which would accrue to individuals from the transaction would come ultimately out of the public. The case is one of the sort which the Legislature designed to prevent when it placed issues of capital by public utilities under Commission supervision.

NEW JERSEY.

The Board of Public Utility Commissioners has approved of an ordinance granting the Phillipsburg Light, Heat & Power Company permission to operate in Phillipsburg. This territory is at present served by the Eastern Pennsylvania Power Company of New Jersey, and in approving a franchise to a competing company the Board specifically defines the change in its position, which has generally been against establishing competition between public utilities, by pointing out that in all such previous cases the public utility in the field furnished safe, adequate and proper service at reasonable rates; while in the present instance the Board holds that the petitioners have proved that the Eastern Pennsylvania did not furnish proper service. In approving the franchise, which provides for certain public service at no charge, the Board says: "The Board has hitherto objected to the imposition on franchises of a money payment as a condition of the grant; and the Board is not satisfied that it has not the power to rescind such conditions as exact unpaid service should such conditions be shown to be unjust or unreasonable. In case the town cares to impose such conditions, taking the risk of their possible annulment by the courts or the Board, the Board will not in this case require their elimination from the franchise."

NEW YORK.

A bill has been referred to committees in the Senate and Assembly directing the Public Service Commission, First District, to investigate the property, rates and fares of the Bronx Gas and Electric Company, in order to ascertain reasonable rates which such company should charge. The bill provides that the Commission may employ special inspectors and experts, if necessary.

A resolution adopted by the Assembly asks that the New York Public Service Commission of the Second District furnish to the Assembly as soon as possible the following information respecting the Westchester Lighting Company; the capitalization of such corporation; its bonded or other indebtedness; the amount of its surplus; the dividends declared during the last calendar year; the salaries paid to its principal officers; the rates of charges for the consumption of gas and electricity in the cities, villages and towns where it operates; and such other facts respecting its financial condition as the Commission may deem useful to enable the Legislature to ascertain the reasonableness of its rates.

WISCONSIN.

Two decisions have been rendered re-

cently by the Wisconsin Supreme Court relating to the jurisdiction of the Railroad Commission. The decision in the case of the Wisconsin Traction, Light, Heat & Power Company against the city of Menasha involves the question of protection from competition. The facts in the case are briefly as follows: The city of Menasha has operated a plant furnishing street-lighting service. It began furnishing a small amount of service to private consumers, and subsequently began to furnish regular commercial electric business in competition with the Wisconsin Traction, Light, Heat & Power Company, a private company furnishing the commercial electric service. The city began furnishing the new service without securing a certificate of public convenience and necessity. Its right to do so was sustained later by the Circuit Court of Winnebago County. The Supreme Court, contrary to the decision of the lower court, holds that before the city can operate a municipal commercial lighting plant, although it has contemplated doing so for years, it must obtain a certificate of convenience and necessity from the Railroad Commission or appeal to the Legislature for relief.

The other case referred to above holds that the Railroad Commission may make independent investigations before issuing rate orders and is not bound by evidence introduced at its hearings by the interested parties. The Commission ordered the Northwestern road to reduce its rates on ice from Silver Springs to Milwaukee after a complaint brought by the Wisconsin Lakes Ice & Cartage Company. An application for a rehearing was denied by the Commission. The company, appealing to the Supreme Court, challenged the validity of the order, declaring it was contrary to law, principally because the findings were not based upon evidence introduced in the case. It contended that if the law did attempt to clothe the Commission with authority to fix rates of carriers upon extraneous evidence, or one-sided investigations conducted by itself, the act was unconstitutional as denying the carriers the guarantees of due process and equal protection of law.

The Railroad Commission authorized the Milwaukee Electric Railway & Light Company to issue refunding and extension bonds to the amount of $3,500,000, these bonds to be in the denomination of $1,000 each and to bear interest at 4.5 per cent per annum payable semi-annually. The bonds are to be secured by a mortgage or trust deed executed by the Railway and Light Company to the Trust Company of America and W. H. Leupp as trustees. The applicant proposes to pledge and deposit these bonds with the Bankers' Trust Company, subject to the provisions of the general and refunding mortgage of the Milwaukee Electric Railway & Light Company as of date December 1, 1911.

The Lena Electric Light & Power Company made application to the Commission to authorize the issuance of $2,500 of its capital stock, such capital stock being authorized to the amount of $5,000, but still unissued. The purpose of this stock according to the applicant is to secure funds for the erecting and equipping of its lighting and power plant and for expenses of organization. The Commission authorized this issue of stock, to be sold at par and for money only as provided by the stock and bond law.

The Mineral Point Telephone Company made application for authority to issue 400 shares of stock of par value of $25, this stock to be exchanged for the 200 stares of stock now outstanding, but having a par value of $50 for each share. The Commission finds upon investigation that the value of the stock outstanding, free and clear of all encumbrances, was $10,000 and that the proposed issue of stock is lawful and for lawful purposes.

An Unusual Cable Trouble.

A very peculiar and unusual accident occurred recently when the Hamburg-American Line Tug No. 3 fouled the United States Government submarine telephone cable extending from the new Barge Office at the Battery to Ellis Island, in New York Harbor.

The cable is made up of 38 stranded conductors. Each conductor is especially insulated and is waterproof. The armor consists of 33 steel wires, three-eighths inch in diameter, wound spirally around the cable, the completed cable being four inches in diameter.

Taking into consideration the size and weight of the cable, it is evident that an enormous power must have been exerted in order to twist it up in the condition found. There were 15 complete turns of the cable about itself, and in one place the two thicknesses of cable were twisted so tightly together that their combined diameter was less than that of the original cable.

The Hamburg-American Line Tug No. 3 is the most powerful tug in the harbor and was built especially to warp the steamship *Imperator* into and out of her pier. She was so badly damaged as the result of this encounter that she was unable to proceed under her own power and had to be towed away.—*New York Telephone Review.*

Copper Exports.

Exports of copper for the week ending February 5 totaled 8,324 tons; since February 1, 6,448 tons; same period last year 8,445 tons.

A New Source of Rubber.

What promises to be a new and large source of rubber supply is about to be opened in the Fiji Islands. Upon nearly all of the islands that comprise this British colony the wild bulia tree, which is exceedingly rich in rubber substance, grows profusely. It has long been known that its rubber percentage is larger than that of any other tree or shrub, far exceeding the Para rubber tree and the guayule shrub in this respect. Experiments that were made from time to time in tapping the bulia tree for the liquid rubber proved unsuccessful. The sap would not exude. Finally attention was directed to the fact that the guayule shrub in Mexico and southwestern Texas was being made a profitable source of rubber, the extraction being by means of crushing and a simple chemical process through which the shrub was put. It was decided to apply this method to the bulia tree and it has proved so successful that steps are on foot to exploit the industry on a large scale. An enormous tonnage of the trees can be grown upon a small tract of land where they are planted and cultivated. There are enough wild trees, however, to provide a supply for many years to come. Owing to the fact that these islands are of comparatively small area and are well supplied with shipping facilities, the bulia trees are convenient to transportation.

The bulia tree is of very rapid growth. It attains a size of eight to ten feet in one year. Experts who have analyzed the bulia rubber report that it is of as high quality as the best Para product.

Colonial Exposition in Java.

It is proposed to hold a Colonial Exposition in the city of Semarang, Java, in the months of September, October and November, 1914. It will celebrate the centennial of the return of the Dutch East Indies under Dutch rule. This exposition will offer opportunities for American manufacturers to introduce their goods in Java, Sumatra, Borneo and neighboring islands.

The representative of the exposition in the United States is T. Greidanus, 136 Water Street, New York City, who will furnish any desired information in regard to the exposition, which will be held under the patronage of the Governor General of the Dutch East Indies.

Telephone Operator Killed.

Miss Lura Price, an operator on the Lone Wolf (Okla.) telephone exchange, was recently killed instantly while at her switchboard, as a result of a cross with an electric light wire.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 198.—Wiring for Electric Ranges.—In wiring up for a number of electric ranges and hot plates in a small hotel kitchen, is it necessary to run a separate circuit for each outfit or can several of the smaller stoves be put on the same circuit? The larger ranges would each take about two kilowatts and the smallest about 600 watts. My plan would be to put three of the small stoves on a circuit and make each circuit heavy enough for two kilowatts. Would it be necessary to put a pilot lamp on each circuit?—G. S. T., Winnipeg, Can.

No. 199.—Steeple Lights.—We have a proposition of putting an electric light on top of a church steeple which is extremely high. The nearest opening to the top of the steeple is 30 feet below the apex. I should like to inquire through your columns whether any contractor ever had a job of this kind and as to how he arranged things so that the lamp would be protected from hail and easily lowered for replacement, so as not to require the frequent services of a steeple jack. Being a church tower, any device installed must, of course, be of sightly nature.—F. W. R., Freeport, Ill.

No. 200. — Electrically Operated Phonograph.—Is any phonograph on the market in which winding of the spring is automatically done by a silent electric motor whenever the spring tension gets down to a certain point? I believe several patents have been issued on electromagnetic release for a brake that stops the disk when the record has been played; has any device of this kind been applied to any phonograph on the market?—M. P. C., Jackson, Mich.

No. 201.—Fixture Wire.—Is heavier wire than standard fixture wire required in fixture work in any city? I have been told that this would soon be required in all large cities because of the tendency to connect flatirons and other appliances to the nearest fixture outlet. Is there any basis for this belief?—S. W., Chicago, Ill.

Answers.

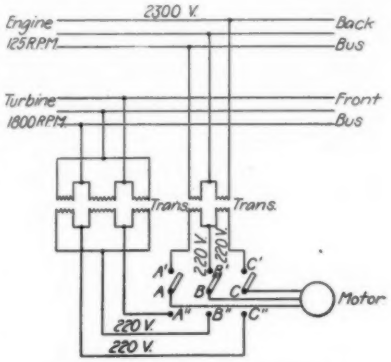
No. 183.—Purity Test for Sal Ammoniac.—I should like to know a simple but accurate way to test sal ammoniac. I find that considerable of this material being sold is adulterated with common salt or other cheap chemicals. The burning test is not accurate enough. I should like to be able to test about what percentage of the test sample is pure sal ammoniac and how much of it is adulterated.—F. H. W., Brooklyn, N. Y.

Put a weighed amount of sal ammoniac in a vessel with a dome-like top and heat it to about 100 degrees centigrade. The sal ammoniac will be volatilized and form or condense on the dome. The residue will be impurities. Lest some of the impurities volatilize at that temperature, the condensed sal ammoniac should also be weighed. The approximate percentage of pure salt can thereby be easily determined—J. H. M., San Francisco, Cal.

No. 193.—Repairs to Spark Coils.—Is there any way to remove the wax so as to permit making repairs on the coils of a jump-spark coil box, such as used on automobiles, without spoiling the finish of the wood?—J. F. P., Canton, O.

It is, of course, understood, that the waxes in spark coils are poured in while they are hot. The solidifying takes place much more rapidly than does the melting and running of the wax in the reverse operation. This is the real explanation of the querist's difficulty. First improvise a sort of baking oven of such a size and shape as to contain the coil from which it is desired to remove the wax and have this oven of such form that the coil may be so placed as to be far from any intense heat, that is from heat which might injure or char the wood, and also so that the coil and case will drain as the wax slowly flows off. It is this "slow flow" of the waxes which you are after rather than a quick melting of them. You have undoubtedly observed the "slow flow" of cold tar due to gravity; try to get the same result with the assistance of a little heat in your baking oven. Make the latter, for example, by taking a ten or twelve-quart pail (tin, iron, or galvanized) and place the coil to be drained in a slanting position in the upper half of a smaller can, inside of the pail. Cover the large pail and apply slow heat for three or four hours.—R. L. L., Minneapolis, Minn.

No. 194.—Motor Circuit.—In operating a hot-well pump, we use a 220-volt three-phase motor, which derives its energy from a bank of three five-kilovolt-ampere transformers that are in turn fed from an outgoing power circuit. Any outside disturbance on this particular line would always drop the switch and consequently shut down the pump. In order to avoid this difficulty we used two transformers of 7.5-kilovolt-ampere capacity which were fed from the back busbars, the leads being clamped to them. The secondary leads were run to the upper and lower terminals of a triple-pole double-throw knife switch, using the hinge terminals for the leads to the motor, as per diagram herewith. At the time of phasing out so as to keep direction of rotation the same, one turbine-driven generator was operating on the front buses, and an engine-driven generator on the back buses. In testing we used two 110-volt lamps in series and from terminal *A'* to *A"* there was no light, from *B'* to *B"* no light, and from *C'* to *C"* no light, but from *A'* to *C"* the two lamps burned dimly. We could not secure any light from any other connection. Thinking possibly that the dim burning of the lamps between *A'* and *C"*



No. 194.—Motor Circuit Diagram.

was caused by the generators coming up to synchronism, we inserted the plugs, but they were nowhere near that point, as the lamps on the synchronoscope and the instrument itself plainly showed. I have tried this over a great many times with the same result, which I cannot account for. Can some of your readers explain it?—R. J. H., Mason City, Iowa.

The most probable cause of this phenomenon is the existence of a current path of fairly high resistance between the terminals *C'* and *C"*. This might be of the character of a metallic vein in the slate panel, or probably some dust on the panel upon which the double-throw switch is mounted. The reason why the lamps glow between *A'* and *C"*, and no other point is because the voltage between these two points, assuming the existence of the current path, will be the highest voltage possible to obtain on the board, that is 220 √ 3 or 380 volts, whereas 220 volts is the maximum voltage between any other points, and this is not enough to cause the lamps to glow. It is the writer's opinion that the 110-volt lamp will show some current when connected across some of the other points.—E. J. R., New York, N. Y.

No. 195.—Polyphase Meters.—Are any reliable polyphase watt-hour meters made with only one disk? Have they any advantages over the type with two disks on one spindle?—N. S. W., Peoria, Ill.

Reliable polyphase watt-hour meters are made with only one disk. These meters consist of two single-phase measuring elements mounted in a single case and acting upon a single aluminum disk. The General Electric Company puts out a polyphase watt-hour meter of this type. In the Fort Wayne type K polyphase watt-hour meter both revolving fields act upon a single drum rotor. The chief advantage claimed for this class of instrument over the type with two disks on one spindle is that the whole construc-

tion is made more light and compact.—H. G. C., Ithaca, N. Y.

There are no polyphase watt-hour meters made with only one disk. The polyphase watt-hour meter is virtually two electrically independent meter elements having a common shaft. Each meter element exerts a torque on the shaft, and the total rotative torque is therefore proportional to the sum of the power in the two metered phases, regardless of the phase relation between the phases. These meters when properly connected indicate the true power in a polyphase system with any degree of unbalance between the phases and at any power-factor. Each of the two meter elements is tested and adjusted separately, in the same way as a single-phase meter. Two disks are used regardless as to whether the meter is connected to a two-phase or three-phase circuit since the two meter circuits will be bridged across all of the leads in either case. Great care is taken to have the two meter elements exactly balanced electrically, so that they will measure correctly regardless of the direction of phase rotation. Special means are employed to make this adjustment of balance possible. The current-magnet punchings of both elements, instead of being riveted at their ends to the main punchings, are attached to a flat plate that can be shifted up and down from the front of the meter after it is assembled. Shifting this plate upwards shortens the upper air-gap and lengthens the lower, and vice versa. Adjustment is made by placing the two current coils in series and the two voltage coils in parallel but so connected that the torque of the two elements oppose, and shifting the plate so that there is no tendency to rotation in either direction. Two screws clamping the main punchings of each element are then tightened, and as these are close to the interlinked joints at the corners, the current punchings are firmly clamped against shifting. It is to be noted that the meter registers exactly the same with both elements on single-phase or with either direction of rotation on polyphase.—E. T. M., Syracuse, N. Y.

No. 196.—Speeding Up Street Cars.—If an electric street car designed for a maximum speed of 25 to 30 miles per hour is to be run part way in a rapid-transit subway at a speed of 40 to 45 miles per hour, can the motor and control equipment be readily adapted to the higher speed desired or must a motor equipment designed for the higher speed be substituted? Could this be accomplished satisfactorily by changing the ratio of the reduction gear?—B. F., Chicago, Ill.

The best way by far to speed up the cars spoken of would be by a change in the gears as it would practically mean rebuilding the motors to do this otherwise. In either case there is a question as to whether the motors are of large enough capacity to do this additional work, and I would very strongly advise against the change being made until inquiry had been made of the manufacturers.—J. H. M., San Francisco, Cal.

If the motors used are not already fully loaded, any change in the reduction gear, if it is not very great, might work satisfactorily; but, if the motors are loaded, it can be seen that the increase in speed effected by changing the ratio of the reduction gear will increase the load on the motors still more, especially when bringing the car up to the desired speed. Thus it would cause excessive heating and increase the liability of burnout. Therefore, I think that a motor designed for higher speed would give better service and probably in the end would be better for the purpose.—W. S. E., Seymour, Conn.

No. 197.—Long-Distance Telephones.—In order to have satisfactory conversation over a very long telephone line, is it necessary that the telephones used at the ends of the line be of exactly the same make, or is it sufficient to have them of the same general type and built for long-distance service?—U. S. P., Cedar Rapids, Iowa.

Satisfactory transmission over very long telephone lines is largely a question as to how well the lines are constructed and maintained. As to construction, the wires should be of proper gauge; insulation should be the best possible; transpositions must be properly cut in; and in case the lines are very long, they should be properly loaded. In regard to the type of telephones for long-distance work, the circuit can be set up between two central-battery telephones, between a central-battery telephone and a local-battery telephone, or between two local-battey telephones. They need not be instruments made by the same manufacturing company, the only condition being that they be designed for standard telephone work and that they be in good working order. However, the *best* transmission is afforded between two local-battery telephones, since the battery supply is local to the telephone, and no matter whether the distance of the telephone from the exchange is short or long, the transmitter is always supplied with the proper current. In a central-battery system, the drop in voltage may be excessive so that the transmitter may probably have but two volts or less impressed across its terminals, instead of 3.5 volts or more as required. This difficulty is remedied by installing a local-battery telephone on the central-battery line. If this be done, two points must be observed: (1) a condenser must be inserted in series with the ringer on account of supervision and (2) the receiver must be *poled*, i. e., the direct current flowing from the exchange battery must pass through the receiver windings in such direction as to strengthen the receiver magnets. This can be tested by suspending the diaphragm to the magnet cores, the correct connection being when the diaphragm is more strongly attracted. Press agents and brokers who do a large amount of long-distance telephoning, are provided with local-battery telephones, even in large towns where central-battery systems are in use, because of the higher quality of transmission.—W. C. W., Superior, Wis.

For the transmission of telephonic conversation over long lines it is not essential that the transmitters at each end of the circuit be of the same transmitting efficiency, although it is desirable that this be the case. The difficulty experienced when the transmitters have a different transmitting efficiency is that the instrument having the greater efficiency will transmit over the greater distance, assuming of course, that the battery supply in both cases is of the same type and quality. This means of course that one subscriber might find that he could hear the other subscriber who has the better instrument but he couldn't make himself heard by the distant party. This condition often exists but is more often due to the battery and substation condition than to any difference in the transmitting efficiency of the transmitters. The make of the instrument which is used is immaterial as long as its efficiency is equal or better than that of the distant transmitter, providing all substation conditions are equal. In case one station has a lower transmitting efficiency than the other any trouble from this source can oftentimes be eliminated by increasing the battery supply at the weaker station.—E. C., Kansas City, Mo.

In order to have satisfactory conversation over a very long telephone line it is not necessary to have instruments of the same type, but they should in all cases be designed for long-distance service. Instruments for long-distance work, that is receivers and transmitters, are always of higher resistance and therefore more sensitive than apparatus for use on local lines. The voltage of the current for long-distance work is generally twice the potential used for short distances, the Bell companies using 48 volts for long lines and 24 volts for short or local lines. The instruments used, therefore, must be designed for both services and obviously an instrument intended for purely short lines would be wholly inadequate for long-distance operation. In using instruments of different make and type great care must be used in seeing that they are suitable for both purposes. The Bell companies in acquiring so-called "independent" plants have in a great many cases upon merging the physical properties retained all of the instruments used in both of the systems, although care has been taken to see that the general characteristics are the same.—E. T. M., Syracuse, N. Y.

Electric Vehicles.

In a paper on "Construction and Operation of Electric Trucks" before the Pittsburgh Section of the American Institute of Electrical Engineers, on January 13, T. H. Schoepf predicted that while the electric vehicle may replace horse-drawn vehicles for delivery service, it cannot compete with the gasoline truck in its particular field of long hauls and high speeds, since the electric may be operated economically at low speeds and for limited distances only. The limiting distances range from 57 miles for a one-half ton truck with a maximum speed of 12 miles per hour to 45 miles for a five-ton truck with a maximum speed of six miles per hour. These figures are based on tests made on a smooth level track without stops. Average conditions encountered over city streets will be practically equivalent to a two-per-cent grade, however, so that distances ranging from 40 to 30 miles will correspond more nearly to average results.

The average results of the electric delivery wagons of McCreary & Company, Pittsburgh, are as follows: number of packages delivered per trip, 354; miles, 32; stops, 108; packages delivered per stop, 3.28; packages delivered per mile, 11.07; running speed, ten miles per hour; average speed over the route, 8.5 miles per hour; actual running time, 2.5 hours out of 9.

The paper was in the main devoted to a detailed description of the construction of trucks; motors and electric control, illustrated with lantern slides.

In a paper on "Electrical Equipment for Automobile Gas Engines," C. E. Wilson stated that at least 75 per cent of all cars sold this year will be equipped completely with electric starting and lighting devices, and probably more than half of the remainder will use electric lamps.

Automobile lighting is best accomplished by a combination of a direct-current generator driven by the engine, and a storage battery. When standing and at low engine speeds, the lighting is supplied by the battery; at higher speeds the generator carries the lighting load and recharges the battery.

Electric car lighting became feasible only with the introduction of the tungsten automobile lamp, as with carbon lamps, the weight of batteries required was too great. The lighting load with six-volt tungsten lamps is about eight amperes, including two 15-candlepower head lights, two 4-candlepower side lights and one two-candlepower tail light. For high-speed driving in the country, 21-candlepower headlight lamps are sometimes used.

The presence of a storage battery allows the use of a motor for starting, one-half horsepower being ample to start an ordinary four-cylinder engine. The torque required to spin a motor is proportional to the cylinder displacement and varies with the oiling, compression and general conditions; the starting torque required being two to three times the torque at cranking speed. A fairly high cranking speed gives a better mixture in the cylinder, and a better spray in the carburetor. The motor should be able to produce a momentary torque three or four times the normal starting torque of the motor to take care of the worst conditions, i. e., starting with the engine cold and the cylinder and bearing oil stiff. There are four possible combinations of lighting, starting and ignition units:

(1) A combined lighting and ignition unit with a separate starting motor.
(2) A combined lighting and starting unit with separate ignition, usually a magneto.
(3) Three separate units for lighting, starting and ignition, one being a magneto.
(4) A single unit for lighting, starting and ignition.

The first combination was the one recommended by the author. The generator carries a commutator for the ignition, and revolves at engine speed on four-cylinder engines and at two-thirds engine speed on six-cylinder engines. Voltage regulation is affected by a series field which bucks the main field. A centrifugal switch closes the generator circuit at an engine speed corresponding to about eight miles per hour on the high gear.

The use of a separate starting motor allows of a big gear reduction, permitting maximum economy in weight and cost, the motor running normally at 2500 revolutions per minute. It is of the four-pole, consequent-pole type. The one-half horsepower size will take care of the ordinary engine, while a three-quarter horsepower size will spin the largest engines at 100 to 125 revolutions per minute for four cylinders, and 80 to 100 revolutions per minute for a six-cylinder engine, the latter being inherently adapted to lower speeds.

The sudden, enormous demand for electric lighting and starting sets has produced a big variety of such devices; many of which are mere makeshifts, entirely unsuited to the work they are called upon to perform. Already there is, however, a very desirable tendency toward standardization along certain lines, as dictated by careful engineering design.

In the discussion, which was participated in by Messrs. Farrer, Randall, Criss, Eaton, Sonnergren, Hipple, McIntire, Reynders, Schoepf and Wilson, the prospective purchaser of starting and lighting devices was cautioned to make a careful examination into the mechanical design of the devices, and several experiences with unsatisfactory devices were given. The multiple spark of the old medical-coil type of battery ignition was compared with the more modern system in which the primary circuit is closed long enough to store the maximum amount of energy, which is discharged into the single spark at the instant of breaking the circuit. The resultant heavy spark is much more satisfactory than the series of smaller sparks given by the trembler type of coil. A centrifugal device automatically provides for a constant time of contact regardless of engine speed, and also advances the spark as the engine speed increases.

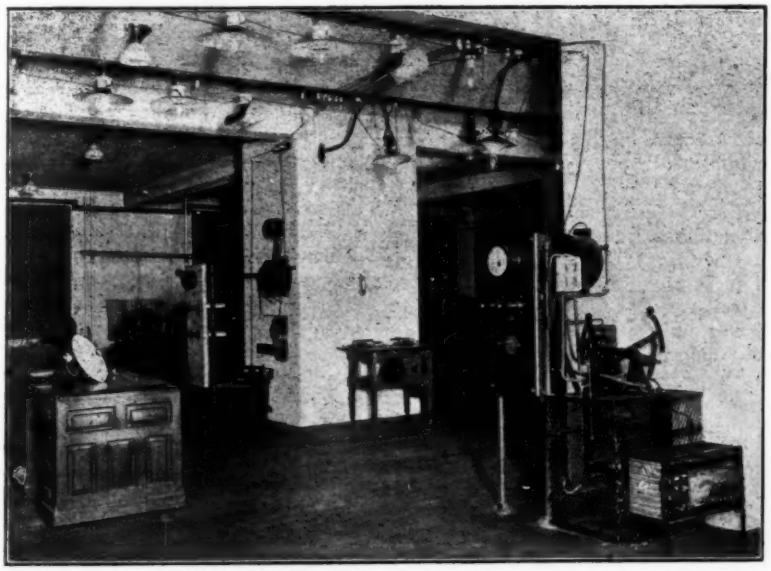
If the same machine is used for starting and lighting, it must either run at engine speed, requiring a big motor, of at least 150 pounds weight —three times the weight of two separate machines, or else a double winding on the armature and an automatic gear-shifting or clutch device, both schemes being cumbersome and heavy. The separate motor described weighs 20 pounds and the generator 35 pounds. The battery with this kind of an outfit requires charging only when the car is used mostly at night, for short runs only.

The reliability of the electric delivery wagon is one of its most important features. It will average not over one day per month out of commission for repairs, as contrasted with four days per month for the gasoline truck and three days per month for the horse-drawn vehicle. The electric is also much quieter and cleaner, a very important consideration for deliveries in a residence district. The modern battery, whether of the lead or Edison type, will stand heavy rates of charging, so that it can be refreshed by a charge over, say, the noon hour. At a constant voltage of 2.3 volts per cell a heavy charge can be put into a lead cell without reaching the gassing or inefficient point. While operating both gasoline and electric trucks of the same capacity for exactly the same service, simultaneously, McCreery and Company found that the electric was about 25 per cent cheaper. It was predicted that the ultimate delivery wagon will have a battery to provide power to electric motors for propulsion, and a continuously operated high-speed, gasoline engine and electric generator to keep the battery constantly charged.

Municipal Lighting Day at University of Iowa.

A new venture into the field of extension service was made at the State University of Iowa during the first week of the month. On Wednesday, February 4, a "Municipal Lighting Day" was held at the University in Iowa City for the benefit of city officials over the state and for others interested in the conduct of municipal affairs.

For some time a need has been felt among Iowa municipalities for scientific information on the subject of street lighting, on the care and regulation of public utilities, and on all the other problems of a like nature that harass city officials. It was in response to this demand that the University's extension department offered its facilities in the form of a special convention.



Electrical Exhibit at University of Iowa.

An unusual and unexpectedly large number of officials attended. Central-station men, city councilmen, mayors, and public-utility officials came from various parts of the state to the number of sixty or more. Owing to the short length of time that the visitors had at their disposal, the whole program of four numbers was crowded into a short one day's session.

The program opened late in the forenoon with a lecture on "Rate-Making for Public Utilities," by Dean W. G. Raymond of the College of Applied Science. Dean Raymond is a member of a commission of nine appointed by the American Society of Civil Engineers to standardize methods for appraising public works and to unify the various systems of control for public utilities.

He took up his subject, not from the expert accountant's point of view, but with the idea of presenting the fundamental things that must be considered in the deciding on rates for public utilities. As an example he took the specific case of a municipally owned plant and by assuming a set of figures, led his hearers on to see what the rates charged for the utility must cover. He believed that the public should expect to pay in rates: First, interest on capital, invested and working; second, cost of operation, including repairs, and third, some sort of a renewal fund. The income should be divided for collection into three parts: First, a portion levied on every taxpayer for the general service of all citizens; second, a second portion levied on all property enjoying potential or actual service because of the existence of the service lines in the vicinity, and third, a third portion paid by the users for the actual service rendered to them exclusively.

The sum of the three items, interest, cost of operation, and depreciation, divided by the entire output, will give the average cost per unit of output. So much of this as is to be paid by consumers for use should be arranged with a sliding scale to be determined for different utilities in different ways, so that the larger users shall pay the lower rates.

If the municipality prefers not to engage in business itself, but wishes to hire some person or corporation to do its business for it he advocated the paying of some sort of wage to the party hired, which way must take the form of a larger return on the capital invested than mere savings bank interest, which should be such as to be fairly called interest and profit on the invested capital.

A theory he held in common with some others was that a public corporation is a public agent, supplying money, constructing works and operating them for hire; that it should be paid for the use of its money at a reasonable interest rate; that it should be paid its operating expense; that it should be repaid the sum that may be reasonably invested in its plant by the time that its plant is worn out or obsolete; and that it should be paid a profit or wage for the service rendered.

The only item in all this that is really difficult to determine is the item of replacement, or as it is generally called, depreciation. He then went into an extended discussion of a plan his committee of the American Society of Civil Engineers had evolved to take care of this item. In concluding, he stated that the profit or wage allowed the corporation should be allowed as a percentage of the cost of operation, it being understood that there will be supervision to the extent of preventing undue padding of this cost, and an agreement whereby the profit or wage may be larger as the cost per unit is smaller.

Dean Raymond's talk was followed in the afternoon by an address by Prof. A. H. Ford, of the Department of Electrical Engineering, on "City Street Lighting." He divided the reasons for the existence of street lighting into three parts: First, to facilitate travel on the highways; second, to ornament and make attractive the streets of a city; and third, to assist in the prevention of crime. The relative importance of these parts varied with the locality.

The illumination of a main travelled street should be sufficient to enable one to see the irregularities of the walk with ease and also to recognize a person at a considerable distance. A business street should be lighted so that one is able to read a notebook with ease at any point along the street. The prevention of crime requires that the light shall be fairly uniform along the street and there shall be no intense shadows cast by obstructions, such as trees and buildings. Each place along the highway must therefore receive light from at least two sources.

When the street is to be really illuminated and not merely supplied with beacons, small lamps placed close together are more economical when the minimum intensity of light is fixed. He advocated the considering of the needs of foot passengers in designing a lighting system more than that of vehicles, since the latter carried lights of their own in these days. He offered for consideration several concrete plans, in which designs for lighting systems were laid out.

The artistic effect of street lighting is dependent upon the poles as

much as upon any one thing. While the question as to what is pleasing in appearance is largely a matter of personal preference, yet some general principles can safety be followed in all cases.

First, the lamp supports should harmonize with the surroundings. The tendency at present, especially in curb lighting systems, is to select standards which are too heavy or too ornate to harmonize with the adjacent buildings. Second, the light itself expresses lightness of structure and therefore heavy standards should not be selected except in cases where the lamps with their shades give the appearance of weight. Third, the pleasing effect of a row of lights is due to symmetrical grouping and therefore care should be used to space the lamps at equal intervals.

The matter of cost of different systems, both as to installation and upkeep, was then gone into to a considerable extent. In conclusion he believed that the lighting of streets could be made a matter of exact design from the illuminating standpoint, and that artistically it follows well-known laws, so that there is no excuse for the present haphazard way of attacking the problem.

After Professor Ford's lecture the convention adjourned to the electrical laboratories, where a special street-lighting system had been built up in a condensed form especially for the occasion. Along the ceiling a double row of the latest and newest types of street-lighting devices had been arranged, fitted with all sorts of lamps, from the flaming arc to the nitrogen-filled tungsten. The lamps were connected in series and controlled from two different supplies; one, a Westinghouse constant-current transformer, and the other, the new A. W. control. The whole system was intended to be a miniature of a regular street-lighting scheme, and convention members were coached in its manipulation and given pointers as to the relative merits of different lighting plans for different localities.

Following the inspection of the street-lighting system, the convention listened to another talk by Charles P. Chase, of Clinton, Iowa, on municipal ownership and the new city-manager method of controlling municipalities. Mr. Chase is head of the Iowa Engineering Company and has had much experience with the problem of regulating public utilities and governing of city-managed properties.

The convention passed a unanimous resolution of appreciation of the efforts made by the University to supply them with interesting and profitable lectures. Another resolution was also passed, asking the University to have the various talks given during the day printed for distribution among their fellow workers who were unable to come. This the University agreed to do.

The convention was entertained at luncheon by the faculty of the College of Applied Science. Every member expressed himself as greatly pleased with the entire program and heartily in favor of the movement the University was making towards extending its usefulness to the people of the state in the matter of giving a better understanding of municipal problems.

Daylight and Artificial Light.

A paper on "Some Problems in Daylight Illumination" was read at a recent meeting of the Illuminating Engineering Society in London, and the discussion occupied two evenings.

At first sight it might perhaps be supposed that daylight illumination, although naturally most important to architects, to school medical officers and factory inspectors, hardly falls within the scope of the illuminating engineer.

But the discussion mentioned above showed that this would be a quite incorrect view. In the first place it is evident that our conception of what constitutes good artificial lighting depends to a great extent on the conditions enjoyed during the day. For example many people hold the opinion that the somewhat higher value of illumination general in the United States, and in some parts of the Continent, as compared with England, is due to climatic conditions. People who are accustomed to bright sunlight and clear skies naturally form a high standard of artificial light; but those who dwell in foggy, smoky cities and in northern latitudes, would be disposed to be satisfied with a lower value.

It seems to be a fact that in buildings where the access of daylight is very deficient, and work is carried on in dim and dismal surroundings, people form a low standard with regard to artificial light and can rarely be prevailed upon to see that better illumination is needed.

Another point to be noted is that much of the factory inspection work now going on has to do with daylight; it is an accepted fact among the medical profession that deficiency of daylight encourages dirt and disease and is generally prejudicial to health. Consequently investigations into the natural and artificial lighting of factories should go hand in hand. An important problem to be settled is how far the minimum illumination required for safety or for certain industrial operations can be laid down for day and artificial light alike. From the discussion referred to above it appeared that in certain circumstances, e. g. in full midday daylight, a much stronger illumination is usually needed than by artificial light. But in the twilight it seems often possible to read by a lower illumination than would be considered satisfactory in the evening, by gas or electric light.

Another point that was strongly brought out in this discussion was the extraordinarily large variations in daylight intensity that commonly occur in different parts of one and the same room. This seems to have a curious bearing on the statements that are often made that such and such a system of artificial light is "nearest to daylight." Sometimes this claim seems to infer that the uniformity of the illumination resembles daylight; yet, as a matter of fact, daylight in a room is usually very far indeed from uniform.

P. J. Waldram, in the course of his paper, referred to the value of photometry in connection with "ancient light" cases (i. e. disputes in which one party claims that the erection of a building has prejudiced the access of daylight into a room or office, and so lessened its practical value). But it seems that such claims are often put forward and settled on the vaguest grounds, for there is, as yet, very little evidence to what extent daylight can be interfered with, before the interference constitutes a positive injury. In addition, before the advent of illumination photometers, it was often extremely difficult to prove that the light had been affected at all.

Mr. Waldram has found photometric measurements very useful in this connection. His method consists in determining the ratio between the actual illumination in a room and the unrestricted illumination out of doors. For this purpose a special tube-attachment, which is pointed towards the sky, is used—a device originally contrived by A. P. Trotter. Prof. L. Weber of Kiel uses a somewhat different form of instrument, but determines the same factor. For example, he states that in a well lighted schoolroom the illumination on the worst lighted desk should not be less than 0.5 per cent of the full daylight illumination out of doors. Another method, described by W. C. Clinton, is based on a comparison between the illumination from a quarter-sphere of sky measured on the window-sill and the illumination on the desk most remote from the window.

Many other methods of attacking daylight problems were discussed in this debate, a number being described in a complete summary of Continental literature prepared by James Kerr.

Yet another interesting experiment described by Messrs. Waldram and Clinton related to the use of small models of buildings, in order to predict beforehand the conditions of daylight illumination which should exist when the building is actually erected. Mr. Waldram showed a curve illustrating the distribution of illumination in a schoolroom at University College. Another similar curve was calculated from photometric measurements in a small model placed on the roof of the college and the results seem to have been very promising. The method is really an easier one to apply to daylight than to artificial light.

One very interesting suggestion was made by Mr. Trotter, namely that an "indicator-photometer" should be prepared which would indicate to the inmates of a room when the daylight illumination had arrived at a certain value and artificial light was needed. He suggested that this might take the form of a small Bunsen disk, but it is also possible that such a contrivance might be based on the use of a selenium cell which would ring a bell when the light had diminished to a certain point.

Such an instrument might be of considerable value in schools and factories and would secure that the artificial illumination never fell below a prescribed standard. It is common knowledge that the interval when daylight is failing and artificial light has not yet been switched on is always a trying one, and that at this period of the day accidents and spoiled work are especially likely to occur,

Midwinter Convention of Electrical Engineers.

The second annual midwinter convention of the American Institute of Electrical Engineers will be held in the Engineering Societies Building, New York City, February 25 to 27. The convention will be under the auspices of the Electric Power Committee, each of the sessions being devoted to one of the subcommittees into which this general commitee is divided. The registration headquarters during the convention will be in the lobby of the Engineering Societies Building.

The convention will open Wednesday morning at 10:00 a. m. with an introductory address by President C. O. Mailloux, after which the following papers and reports will be presented:

"Electric Power," by D. B. Rushmore and E. A. Lof.

Subcommittee report, "Scope of the Engineering Data Subcommittee," P. H. Thomas, chairman.

Subcommittee report, "The Feasibility of an A. I. E. E. Handbook," Harold Pender, chairman.

At the afternoon session the following papers will be presented:

Protective Reactances in Large Power Stations," by James Lyman, Allen M. Roseman, and Leslie L. Perry.

"Outdoor versus Indoor Substations," by Alexander Macomber.

"Indoor and Outdoor Substations in Pennsylvania," by H. L. Fullerton.

"Outdoor Substations in New England," by Fred L. Hunt.

"Outdoor Substations in the Middle West," by Leslie L. Perry.

"Suggestions for Discussion on Electrical Features of Power-Station Design," by A. H. Kruesi.

Thursday, 10:00 a. m. Transmission Session.—Subcommittee report, "Problems of High-Tension Transmission Lines," P. W. Sothman, chairman. Appendix 1, "Deterioration of Porcelain Insulators in Service," by J. A. Brundige. Appendix 2, "Radius of Influence of a Direct Lightning Stroke," by L. C. Nicholson. Appendix 3, "Transmission-Line Problems in the West," by P. M. Downing. Appendix 4, "Switching," by G. Faccioli.

There will also be a paper on "Practical Operation of Supension Insulators," by H. W. Buck.

Afternoon Session.—"The Economical Capacity of a Combined Hydroelectric and Steam Power Plant," by C. T. Hutchinson.

"The Cost of Electricity at the Source," by H. M. Hobart.

Friday, 10:00 a. m. Distribution Session.—Subcommitee report, "Distribution of Electrical Energy." P. Junkersfeld, chairman. Appendix 1, "Three Wire Direct-Current Distribution," by Philip Torchio. Appendix 2, "Alternating-Current Distribution," by H. B. Gear. Appendix 3, "Effect of Consumers' Apparatus and Wiring on Distribution," by H. Goodwin. Appendix 4, "Direct-Current Distribution for Surface Railways—Url an Service," by R. H. Rice. Appendix 5, "Direct-Current Distribution for Underground and Elevated Railways," by E. J. Blair. Appendix 6, "Direct-Current Distribution for Interurban and Steam Railroads," by W. G. Carlton. Appendix 7, "Alternating-Current Distribution for Interurban and Steam Railroad," by W. S. Murray. Appendix 8, "The Relations of Distribution Problems and Switching Equipment," by E. B. Merriam. Appendix 9, "Distribution for Street-Lighting Service," by P. M. Lincoln.

Afternoon Session.—"Recording Devices," by C. P. Steinmetz. "High-Frequency Relays," by E. E. F. Creighton.

Under the auspices of the Institute and the Commitee on Organization of the International Electrical Congress, 1915, there will be held on Wednesday evening, February 25, in the ball room of the new Hotel Biltmore, a dinner-dance. The purpose of this meeting is to afford an opportunity for the members and guests to meet and become informed of the plans for the San Francisco Congress. Dinner will commence promptly at 7:15 p. m. and the dance at 10 p. m Subscription $5.00 per person. Brief reports will be made during the dinner on the organization of the Congress.

On Thursday, February 26, at 8:30 p. m., in the Auditorium, a meeting will be held under the auspices of the Executive Committee of the Commitee on Organization of the International Electrical Congress. Ladies are invited and it is expected that the meeting will afford much of technical and popular interest. The following program of address will be delivered: 'The International Electrical Congress," by C. P. Steinmetz; "The Panama-Pacific International Exposition," by William Rader; "The Lighting of the Panama-Pacific International Exposition," by W. D. A. Ryan; "Some Science Features of a Trip to San Francisco," by James A. Cruikshank; "Some Electrical Features of a Trip to San Francisco," by P. M. Lincoln.

Safety Conference in Nevada.

"Safety-First" conference was held at the University of Nevada, Reno, Nev., on January 26 and 27. This meeting was arranged by the State Industrial Commission and the Engineering Department of the University. It was attended by about 600 persons from various Western states, including representatives of mining, railroad, manufacturing and power-plant interests, as well as state officials, labor representatives, engineers and others.

Electrical matters were considered at the second day of the conference. The meeting on Tuesday morning was presided over by A. H. Babcock, electrical engineer of the Southern Pacific Railroad. The principal paper presented was by W. K. Freudenberger, chief engineer of the Nevada State Public Service Commission, and was entitled "Safety Regulations for Electrical Power Companies."

At the session on Tuesday afternoon Governor Oddie presided. A paper was presented by J. G. Scrugham, professor of electrical engineering in the University of Nevada, on "Electric Headlights."

On Monday evening there was a demonstration of wireless telegraphy and high-potential discharges in the Department of Electrical Engineering and Physics of the University.

J. G. White Corporation to Handle Flood Problem for China.

It has been officially announced by the American Red Cross that the Chinese Government has authorized the issue of $20,000,000 of bonds for the future prevention of floods in the Huai River Valley in China, and that The J. G. White Engineering Corporation has been designated to undertake the construction of the Huai River works. The whole enterprise depends upon the ability of the Chinese Government to find a market for the proposed bond issue. It is anticipated that there will be no difficulty in this connection, and the prospect is that American money as well as American engineers will be largely involved.

Dr. Chen Chin-Tao is now on his way to America to represent his country in the negotiations, and five engineers will be assigned to confer with The J. G. White Engineering Corporation and Dr. Chen Chin-Tao, and proceed to China in time to observe the next overflow of the Huai River, which generally occurs in July.

At the earliest possible moment the development work will proceed, and The J. G. White Engineering Corporation will take charge of one of the most important engineering and construction problems in which American engineering talent has been concerned in China. The project includes the reclamation of about 17,000 square miles. The work will require approximately six years to complete, and employment will be given to about 100,000 men. The project will involve dredging to deepen the channel of the river and the Grand Canal; also the construction of dams and reservoirs to keep the Huai in its proper course, and to impound its surplus water and divert the streams flowing into the Huai, which, at the time of floods, greatly increase its overflow. The Huai River, for the greater part of its length, flows between banks that are elevated above the surrounding country, and in times past the river in overflowing its banks has changed the geography of an entire province over night.

It is the plan of the Chinese Government to pay the principal and interest of the proposed $20,000,000 bond issue from taxes to be levied on the lands that will be benefited in the flood district, and also from rentals and the sale of about one million acres of land, which, it is estimated, will be reclaimed.

Electric Line in Palestine.

A concession for the construction of an electric line from Jerusalem to Bethlehem was granted on January 27 by the Turkish Government to the French bank that recently supplied Turkey with money to purchase the Brazilian dreadnought *Rio de Janeiro*.

CENSUS REPORT ON TELEGRAPHS AND CABLES.

Ocean Cable Systems.

Preliminary figures of the forthcoming report on the ocean cable and telegraph systems of the United States have been given out by Director Harris, of the Bureau of the Census. The statistics relate to the years ending December 31, for 1912 and 1907.

Included in the number of ocean cable systems is one system operated by a land telegraph company. The financial details for this, and the number of employees not having been segregated in the single report submitted, are made a part of the report for land telegraph systems. The miles of cable and number of cable messages, however, are embraced in the cable-systems report.

The mileage of ocean cables is that owned or leased by the operating companies and is the entire length of such cables wherever located. The financial statistics, therefore, concern to some extent operations in foreign countries. Statistics of merely holding companies and of federal governmental cables are excluded.

The statistics of the two foreign companies having cables landing in this country and doing business here are not included. These companies are the Deutsche Atlantische Telegraphengesellschaft and the Compagnie Francaise des Cables Telegraphiques.

The figures show that the increase in nautical miles of cable was 21,375, or 46.2 per cent. There was a slight decrease in number of cable messages reported, but the gain in amount of income received from telegraph traffic was $727,518, or 9.9 per cent. The net income, as reported, decreased $1,076,227, or 26.7 per cent, there having been an increase in cost of operation and maintenance amounting to $1,803,279, or 81.8 per cent. No charges for depreciation were reported in the expense account at either census. The increase in profit and loss surplus was $3,001,083, or 85.8 per cent. Reserves were increased very largely, but the total cannot be shown separately, as it is practically that of one system. The amount of capital stock outstanding was $2,689,400, or 5.1 per cent greater in 1912 than in 1907; the number of wage-earners increased 449, or 37.2 per cent, and the salaries and wages $251,931, or 27.5 per cent.

The figures in detail are shown in Table I.

TABLE I—OCEAN CABLES.

	1912	1907	Per cent of increase:[1] 1907-1912
Number of companies or systems[2]	7	7	....
Nautical miles of ocean cable[2]	67,676	46,301	46.2
Number of messages[3]	[5]5,841,280	[5]5,869,317	—0.5
Income, total	$8,469,374	$7,671,700	10.4
Telegraph traffic	$8,065,798	$7,338,280	9.9
All other sources	$403,576	$333,420	21.0
Net income	$2,952,847	$4,079,074	—26.7
Expenses, total	$5,516,527	$3,642,626	51.4
General operation and maintenance, including salaries, wages and legal expenses	$4,008,218	$2,204,939	81.8
Interest and taxes	$1,214,554	$1,190,308	2.0
All other expenses	$293,755	$247,379	18.7
Balance sheet:			
Assets, total	$107,583,155	$95,624,892	12.5
Construction and equipment, including real estate, etc	$78,136,115	$77,438,339	0.9
Stocks and bonds of other companies, treasury stocks, and "other permanent investments"	$16,811,087	$12,971,564	29.6
Cash and current assets, including supplies[4]	$12,635,953	$5,214,989	142.3
Liabilities, total	$107,583,155	$95,624,892	12.5
Capital stock	$55,489,400	$52,800,000	5.1
Funded debt and reserves	$43,549,451	[5]$36,561,391	19.1
Accounts payable	$1,459,797	$314,955	363.5
Dividends due and sundries	$587,229	[6]$2,452,351	139.5
Profit and loss surplus	$6,497,278	$3,496,195	85.8
Capitalization:			
Capital stock outstanding, par value	$55,489,400	$52,800,000	5.1
Dividends on stock	$3,040,200	$2,533,041	20.0
Employees and salaries and wages:			
Average number	[7]1,656	1,207	37.2
Salaries and wages	$1,167,014	$915,083	27.5

[1]A minus sign (—) denotes decrease.
[2]Includes returns for Western Union Telegraph Company, but no segregation could be made of financial statistics or employees for the cable business of this company.
[3]Number for one company estimated by company reporting.
[4]Includes sinking and other special funds and sundries for 1912 and industries only for 1907.
[5]Includes floating debt.
[6]Includes interest due and accrued.
[7]Number employed September 16, 1912.

Land Telegraph Systems.

All telegraph systems, execpt one, reporting are operated by companies incorporated in the United States. The exception is a Canadian company, but its report is limited to operations in this country alone. No balance sheet is included for this company, nor for one company belonging in the United States and leasing its plant from a railway corporation.

Systems operated by the Federal Government for military or commercial purposes, either in Alaska or the insular possessions, and telegraphs owned and operated exclusively by railways, are not included. Neither do the figures include

the incidental telegraph business done by telephone companies over their own wires.

The number of wage-earners does not include railway operators employed at certain railway stations and doing work also for telegraph companies.

The differences in the system of accounts between 1907 and 1912 to some extent invalidates comparison of the reports for these years. No statement of charges for depreciation or for sinking fund, if charged against income, was made in 1907.

During the semi-decade 1907-1912 the miles of single wire increased by 236,235, or 15 per cent. The increase in number of offices was 1,725, or 5.9 per cent. This number includes offices operated in connection with railway companies.

While the gross income increased $12,381,301, or 28.2 per cent, the expenses of all kinds increased by a greater amount—$14,625,438, or 38.2 per cent. The net income by this showing was therefore reduced $2,244,137, or 39.5 per cent.

The increase in construction and equipment account appears as $11,303,011, or 8.5 per cent, but the amount reported for stocks and bonds, and other permanent investments decreased $6,392,290, or 27.2 per cent. There was an increase of $19,612,023, or 179.8 per cent, in cash and current assets, including supplies and sundries, much of this being in cash and current assets only.

The capital stock outstanding increased $1,948,860, or 1.9 per cent, and the funded debt increased $2,463,000, or 6.6 per cent. There was a notable increase of $3,377,471, or 180 per cent in reserves.

The sundry account under "Liabilities" is swelled by the inclusion of the capital stock of subcompanies assumed by one great company reporting, and by the inclusion of certain deferred liabilities.

The figures in detail are shown in Table II.

TABLE II.—TELEGRAPH SYSTEMS.

	1912	1907	Per cent of increase:[1] 1907-1912
Number of companies or systems	22	20	10.0
Miles of pole line	[2]247,528	[2]239,646	3.3
Miles of single wire owned and leased	[3]1,814,196	1,577,961	15.0
Number of messages	[4]103,536,418	[5]97,924,759	5.7
Number of telegraph offices	30,781	29,056	5.9
Income, total	$56,293,469	$43,912,168	28.2
Telegraph traffic	$52,337,211	$37,916,907	38.0
All other sources	$3,956,258	$5,995,261	—34.0
Net income for the year	[6]$3,431,044	$5,675,181	—39.5
Expenses, total	$52,862,425	$38,236,987	38.2
General operation and maintenance	$39,067,011	$31,852,359	22.6
Interest and taxes	$2,740,827	$2,246,382	22.0
All other expenses	[7]$11,054,587	$4,138,246	167.1
Balance sheet:			
Assets, total	$191,516,700	$166,530,835	15.0
Construction and equipment, including real estate, etc	$143,910,631	$132,607,620	8.5
Stocks and bonds, including other permanent investments and treasury stock	$17,122,592	$23,514,882	—27.2
Cash and current assets, including supplies and sundries	$29,672,528	$10,060,505	179.8
Profit and loss deficit	$810,949	$347,828	133.1
Liabilities, total	$191,516,700	$166,530,835	15.0
Capital stock	$104,274,435	$102,289,575	1.9
Funded debt	$34,741,000	$37,204,000	—6.6
Reserves	$5,254,329	$1,876,858	180.0
Accounts payable	$12,175,438	$7,894,978	54.2
Dividends, taxes and interest due and accrued	$1,460,733	.....	....
Sundries	[8]$23,447,146	[9]$87,852	....
Profit and loss surplus	$10,163,619	$17,177,572	—40.8
Net surplus	$9,352,670	$16,829,744	—44.4
Capitalization:			
Capital stock outstanding, par value	$104,274,435	$102,289,575	1.9
Dividends on stock	$3,139,861	$4,944,042	—36.5
Funded debt	$34,741,000	$37,204,000	—6.6
Employees and salaries and wages:			
Average number	[10]35,639	26,827	32.8
Salaries and wages	$23,797,980	$16,893,166	40.9

[1]A minus sign (—) denotes decrease.
[2]Exclusive of pole line wholly owned and used by railway companies.
[3]Does not include 22,816 nautical miles of ocean cable operated by one land telegraph company. Exclusive also of 314,329 miles of wire wholly owned and operated by railway companies for their own business.
[4]Does not include land messages sent over its 207 miles of leased land wire by a wireless company, nor ocean cable messages.
[5]Exclusive of ocean cable messages.
[6]Less all expenses, including charges for depreciation.
[7]Includes charges for depreciation, which were not included in expense in 1907.
[8]Includes assumed capital stock of subcompanies, deferred noninterest-bearing liabilities payable only on determination of leases, and floating debt.
[9]Includes floating debt.
[10]Number employed September 16, 1912.

Wireless Telegraph Systems.

Figures for wireless telegraph systems of the United States include only the plants operated for commercial purposes. Federal government plants and all plants, whatever their ownership, in the insular possessions, are excluded. The report of one wireless company in the hands of receivers is not included. Its principal business was that of renting apparatus and perfecting inventions. One company did some exclusively land telegraph business over a leased wire. The details could not be wholly segregated and are included in the report.

The figures presented show that while there was a net deficit in operation in 1907, a net income was the result of the business in 1912. The gross income increased $562,367, or 527 per cent over 1907. A great part of this income was the rental of wireless apparatus for ship equipment. The expenses, including charges for depreciation in 1912, increased $504,091, or 314.4 per cent. The great decrease in assets—$22,581,700, or 68.5 per cent—is due to the disappearance of one large company in a merger of interests. The decrease was largely in the value placed on patent rights, good will, and contracts in 1907, and on treasury stock.

The amount expended for construction and equipment increased $888,156, or 280 per cent, over 1907, and the number of employees 782, or 444 per cent; the increase in salaries and wages being $311,835, or 381 per cent.

The figures in detail are shown in Table III.

TABLE III—WIRELESS SYSTEMS.

	1912	1907	Per cent of increase:[1] 1907-1912
Number of companies or systems	4	5	—20.0
Number of messages	[2]285,091	154,617	84.4
Number of tower stations	74	117	—36.8
Income, total	$669,158	$106,791	526.6
Net income	[3]$4,738	.....	....
Expense, total	$664,420	$160,329	314.4
General operation and maintenance	$588,712	$117,480	401.1
Interest and taxes	$7,826	$5,562	40.7
All other expenses	$67,882	$37,287	82.1
Net deficit	.....	$53,538	....
Balance sheet:			
Assets, total	$10,377,197	$32,958,897	—68.5
Construction and equipment, including real estate, etc	$1,205,770	$317,614	279.6
Cash and current assets, including supplies[4]	$9,171,427	$32,196,456	—71.5
Profit and loss deficit	.....	$444,827	....
Liabilities, total	$10,377,197	$32,958,897	—68.5
Capital stock	$9,602,570	$32,676,242	—70.6
Floating debt and mortgages	$18,483	$37,145	50.2
Accounts payable	[5]$583,160	$245,510	137.5
Profit and loss surplus	$172,984	.....	....
Capitalization:			
Capital stock outstanding, par value	$9,602,570	$32,676,242	—70.6
Employees and salaries and wages:			
Average number	[6]958	176	444.3
Salaries and wages	$393,606	$81,771	381.4

[1]A minus sign (—) denotes decrease.
[2]Includes 5,013 land messages sent over a leased land wire by a wireless company doing land telegraph business also.
[3]Less all expenses, including charges for depreciation.
[4]Includes stocks, bonds, and sundries.
[5]Includes reserves, cash investments, interest and taxes due and accrued, and sundries.
[6]Number employed September 16, 1912. Includes, in some cases, number of operators on shipboard who, in addition to wages, receive board and quarters.

National Chamber of Commerce Holds Annual Meeting.

One of the most important gatherings of business men that has ever taken place in this country was held in Washington, D. C., during the past week. The Chamber of Commerce of the United States of America held its second annual convention there, beginning Wednesday, February 11, and ending Friday, February 13, preliminary meetings of the executive committee, the directors, and the national council having been held, respectively, on February 7, 9 and 10.

The principal feature of the program of the convention was a discussion of the anti-trust legislation proposed in, and now being considered by Congress with special reference to the views recently expressed by President Wilson. That these views have not met with complete acceptance is evident from a reading of some of the addresses. Important reports of committees were also made, including one on patents, by James G. Cutler, general chairman of the patent, trademark and copyright committee of the organization, Mr. Cutler being president of the Cutler Mail Chute Company, of Rochester, N. Y.

Frederick P. Fish, former president of the American Telephone & Telegraph Company, was one of the speakers, addressing himself to the question "Is the Trust Form of Organization Industrially Efficient?" C. A. Prouty, former member of the Interstate Commerce Commission, and now director of the Physical Valuation of Railroads Board, spoke on the valuation of railroads. One session of the convention was devoted to the subject of "The Maintenance of Resale Prices," the Commissioner of Corporations, Joseph E. Davies, presenting the Government's point of view, and discussions being presented by William H. Ingersoll, of Robert H. Ingersoll & Brother, New York, and Donald Dey, of Dey Brothers & Company, New York. Secretary Wilson spoke on the relation of the Department of Labor to industries and commerce, and at the banquet of the convention Secretary Redfield, of the Department of Commerce, spoke on the work of his department. Henry R. Seager, professor of political economy at Columbia University, New York, spoke on the proposed trust legislation now before Congress, and Charles R. Van Hise, president of the University of Wisconsin, spoke on the concentration of industry in the United States. Victor Morawetz, of the New York bar, director of the Norfolk & Western Railway, and a director of the National Bank of Commerce of New York, joined the symposium presented on the proposed anti-trust legislation. Guy E. Tripp, chairman of the Board of Directors of the Westinghouse Electric & Manufacturing Company, also took part in the discussion of the proposed "anti-trust" legislation, delivering an address on Thursday.

In a little less than 18 months there has come into existence in the United States, in the Chamber of Commerce of the United States of America, of which Harry A. Wheeler, of Chicago, has been president since its founding, a powerful grouping of the commercial elements of the nation, so that members of the chamber attending the convention at Washington believe the time has come when it is possible for the chamber to speak with authority as to that which is known as "business opinion." Most of the addresses and committee reports delivered at the convention were prepared in the light of, and on a basis of discussion of, the recently enunciated views of President Wilson, so that these addresses were regarded as replies to the views of the President. Coming as these addresses did from many of the leading business men and economists of the country, some of whom seldom appear in print, the views expressed are certain to attract deep attention throughout the country.

The Chamber of Commerce of the United States now has 487 organizations federated in it, including the American Electric Railway Manufacturers' Association, and many other organizations allied with the electrical industries. These organizations represent, in round numbers, 222,000 business men of the United States.

Extracts from some of the addresses are given as follows:

Committee on Patents, Trade Marks and Copyrights.

The report of the Chamber's Committee on Patents, Trade Marks and Copyrights, containing recommendations for action by the Chamber, was approved by the Board of Directors at a meeting held at Rochester, N. Y., December 8, 9, and 10, 1913. Owing to the proximity of the annual meeting it was decided not to submit the report to a referendum vote. The committee report is as follows:

"The Congress has enacted the Kahn Law, known as Public No. 14 (H. R. 7595), with reference to the Panama Pacific Exposition, and approved by the President September 18, 1913.

"In respect to this law, we have to report that while approving legislation to protect foreign exhibitors against infringement of patents, and the unauthorized copying of patterns, models, and designs, and desiring in every way to foster the efforts to encourage the exhibition of foreign products, we believe that the present form of the Act does not appropriately define its purpose nor adequately safeguard the interests of our own people, and we therefore approve the efforts to secure from Congress an amendment or correction of the Act which will relieve it of the provisions which have caused much concern.

"In view of the very serious objections to provisions of this Act, and to the very serious consequences to the business of the country which would follow the enactment of some, perhaps many, of the numerous bills introduced at recent sessions of the Congress amending and altering the patent laws, your Committee respectfully recommends that a referendum be taken upon the proposition that Congress shall be petitioned,

"First, that the Kahn Law be amended as follows:

"Sec. 3, after exhibited, line 8, insert, 'provided that the same be new and not previously known or used in this country.'

"After Sec. 6, insert:

"'Sec. 7. Provided that any defendant in any suit brought under the provisions of this Act may avail himself of any defense that may be made under existing laws pertaining to patents for inventions or designs, trademarks or copyrights, and the same shall have the same force and effect as if pleaded under existing laws.'

"Second, to enact as soon as possible, a law establishing a Court of Patent Appeals, to which cases may be taken by either party to a patent suit from the Circuit Court of Appeals, thus doing away with the existing situation under which a patent may be declared valid and infringed by the Circuit Court of Appeals in one district, and held to be invalid in another.

"Third, that an expert commission be created and empowered to investigate the patent laws and the practice under them, to recommend to the Congress such legislation as they may conclude to be necessary to perfect the one and to correct any abuses discovered in the other, and that no other patent legislation be enacted until this commission has made its report.

The Valuation of Railroads.

The Hon. C. A. Prouty discussed the subject of "The Valuation of Railroads," considering the matter in its broad aspect and dividing the subject into three heads—(1) the thing to be done; (2) the time and expense required; and (3) the benefit to be derived.

In the course of his address, Mr. Prouty said that while the problem of establishing railway rates would not be solved by this physical valuation the problem will be enormously simplified. It can be known with certainty whether the general level of rates is or is not too high, and in establishing the charges to be observed by a single carrier, even in placing the rate upon a single commodity, it will be of much benefit to know the value of

the property involved. Every railroad commissioner, Mr. Prouty said, would join him in saying that here is the only solid foundation upon which he can stand; that the determination of these values is indispensable to the just and intelligent administration of his work. The main questions cannot be answered nor the situations justly dealt with until the actual value of the properties are known. This is the question which must be answered before the problem can be intelligently discussed. For this reason above all it is important that the work should be pressed to a completion in the most expeditious and most trustworthy manner possible.

Protection from Price Juggling.

William H. Ingersoll, of Robert H. Ingersoll & Brother, New York, in discussing the question of "Protection from Price Juggling," said that new problems of merchandising come with each decade, and that now we find the standard brands being employed against the wishes of their producers to further the tendency to monopoly in the retail market. The process used by certain classes of retailers not only threatens the existence of the brands themselves, but tends to divert trade from the local centers to the great stores of the great cities, oppresses the chance of the small merchants in cities and smaller towns, and brings about the same concentration of business in the retail field that thrust upon the people the trust problem in the industrial field. The cut price is being ruthlessly used on the country's well known standard brands of merchandise in combination with exaggerated bargain claims on miscellaneous and unknown commodities. When a well known article is sold at a cut price the first effect is a stimulated demand if the offer is bona fide. The secondary effect is that people are led to believe that they ought to get the goods regularly at the reduced price, and that those who charge more are receiving extortionate profits. The goods are cheapened in their estimation. They are no longer satisfied to pay former prices, so that the good will of the maker is seriously impaired. Other dealers in the community are unwilling to handle the goods at higher prices than are quoted elsewhere, and in fact would have a very limited sale if they tried, and it would endanger their future patronage; so that they find it better business policy to meet the cut price and close out the goods and not to carry them thereafter or to carry very limited stocks, which are sold only upon urgent demand, after the customer has declined the "something else" which the dealer, in the preservation of his very existence, finds it necessary to recommend, because even though it is unknown, it pays him the necessary profit to meet his expenses.

Discussion of the Anti-Trust Legislation.

Victor Morawetz, of New York, said that the wealth and prosperity of the country are due in a great measure to the fact that men of ability and courage have had the freedom of action as well as the opportunity to initiate and carry to success big enterprises—big business. To shackle business merely because it is big, or to penalize success merely because its rewards are large, would be a step backward. To hamper honest and legitimate enterprise merely to strike at those who break the law or benefit themselves by illegal means would not be enlightened and wise legislation. The country cannot prosper if all business must be conducted under a set of rules adapted only to a grocery store. Undoubtedly some legislation supplementary to the Anti-Trust Act is desirable. The creation of a trade commission, consisting of experienced and able men would be a wise step. There is, however, a good deal of misapprehension as to the ineffectiveness and uncertainty of the existing Anti-Trust law. The cause of this misapprehension is to be found in certain early decisions and opinions announced by the Supreme Court of the United States when the constitutionality and effect of the Anti-Trust Act were first considered by it. The Anti-Trust Act prohibits in the broadest language restrictions of trade and monopolizing, and it is now settled that the purpose and policy of the Act cannot be avoided by any disguise or subterfuge. The bill to define the Anti-Trust Act by including within its prohibitions certain definite offenses is especially subject to criticism on the ground that it defines nothing, that it clarifies nothing, and that it would create a cloud of uncertainty and doubt.

Concentration of Industry in the United States.

In speaking of the subject "Concentration of Industry in the United States," Charles R. Van Hise, president of the University of Wisconsin, said, in part: "There may be great magnitude in business and in monopoly. Indeed it is believed that by far the greater number of large organizations fall short of monopoly." Mr. Van Hise said that not only did he hold that not all large business is monopolistic, but that concentration up to a certain point is necessary in order to give efficiency. Those who were attacking combinations assert that a great many of the large industrial organizations have exceeded the magnitude which gives the highest efficiency. On the other hand, it may be asserted that very few of them have gone beyond the stage which gives increased efficiency. Neither side can prove his case because of lack of facts. If, as a result of investigation, it should be shown that the larger number of organizations have not gone beyond the magnitude which gives increased efficiency in production, then that magnitude should be retained. However, it does not follow that the large organization which has been highly efficient in the manufacture of its goods has sold them at reasonable rates. It does not at all follow that the public has secured a fair share of the advantage which resulted from their increased efficiency. If, however, it be assumed that considerable magnitude is necessary to give efficiency and the problem is one of division of profits, its solution must be along a different line from that if the greater number of large organizations have surpassed the magnitude which gives efficiency. In the former case the organization should not be destroyed but methods should be devised by which the profits are fairly distributed. Mr. Van Hise, in discussing the satisfaction that has been expressed over the dissolution of the Standard Oil Company, the American Tobacco Company, the American Telephone & Telegraph Company, and others, raises the question as to what advantage has been derived by the public from the disintegration of these corporations. The chief interest of the public in whether kerosene or gasoline is manufactured by one company or ten companies is the price paid for the product, and so with other commodities or services. Wherein he asks, "Will the public be benefited by the voluntary separation of the Bell Telephone Company and the Western Union Telegraph Company?" The economies of joint operation are so evident that if both were administered by the government in this country no one for a moment would think that they should be independent. Indeed, the Departmental Committee that has been considering the question, recommended within the fortnight that the government acquire the telephones and telegraphs of the country in order that they might be operated as a unit in connection with the mails. Why then should they be compelled to separate and therefore become less efficient than they have been under consolidation? When glee is expressed at the disintegration of a great organization we should have a satisfactory answer to the question "Where does the public come in?" before we join in the mirth. If the public has gained anything in price reduction for standard articles or for service by the destruction of the great corporations,

would it not have been wiser to take steps to see that their profits were made reasonable, that the great advantages which come from their magnitude, efficiency and co-operation should be shared in a large measure by the public? There can be no question that the competitive system when unrestrained is positively opposed to the policy of conservation. The wastefulness of the competitive system may be proved with regard to every product which is taken from the earth.

Conserving Commercial and Industrial Prosperity.

In discussing the broad subject of anti-trust legislation, Frederick P. Fish, formerly president of the American Telephone & Telegraph Company, said that it should be remembered that the interest of the people as a whole should be alone considered. There should be no thought of attacking or promoting business enterprises, large or small, or other methods, generally or in specific cases, unless the interest of the community, as distinguished from that of any individual or class of individuals, requires such action. Under the conditions prevailing at present it is obvious that commercial and industrial prosperity is essential. Legislation which impairs that general prosperity is most unfortunate. The regular employment of our people, their earning capacity, for adequate compensation for their effort, the opportunity for the individual for advancement, and the necessary supply of products of proper quality and at a reasonable cost would all be jeopardized if our industries did not prosper. No one can deny that the American people as a whole deliberately fostered and promoted the line of development which has resulted in present conditions, for they responded freely and willingly to the demands of the times, which, as far as they could see, could be met only by such organization and such methods as have been worked out ,automatically, as it were, during the last 50 years, and which now prevail. Our modern business organization and business methods have developed automatically under the economic theory that in business there should be free play for individual intelligence, individual activity, individual initiative and individual effort. Every man was encouraged to build up as large an enterprise as he could; to get for himself as much trade as he could, and within the limits imposed by law and the principles of fair dealing was entirely free to exercise his ingenuity, intelligence and business skill so as to get and to do as large a business as possible. Business men are no longer free within the limits of honesty and fair dealing, as generally understood, to work out their own salvation by strenuous enterprise and strenuous individual effort. They are hampered on every side by restrictions, which a generation ago would have seemed inconceivably foolish and inconsistent with sound development. Even if the new view is correct, we should be very careful that it is not carried so far as to suppress individual effort and paralyze progress more than the public interest requires.

By way of making a constructive suggestion, Mr. Fish declared that wherever there is a complicated situation involving many elements, some of them contradictory in character, and the matter is one that vitally concerns our national well-being, the value of a commission made up of the very best men in the country is incalculably great. Experience is ample to make it possible for trained men to get out and correlate the facts and to draw conclusions from them as to every aspect of this great question. They could determine the economic necessities and the way in which they are to be met. After thorough investigation they could make a report as to how the Sherman Law might be amended to advantage, and what other legislation, if any is required, could put our industrial situation on a sound basis and to protect our business, as well as our people, against harm.

Referring in a general way to the many bills now being considered, Mr. Fish said that he could not help thinking that if these bills, in their present form, were enacted into law the conduct of our business would suffer. Back of all these suggestions as to detailed legislation is the broad question of whether we are approaching the subject of proper control and the development of our industries in the right way. He believes that it would be greatly to our advantage if that underlying question could be studied and we could be sure that it was settled on a sound basis before we advance further into the regions of the unknown by adopting speculative suggestions based on unproved and at least doubtful theories rather than on the facts and necessities of our business situation.

The Prussian railway authorities are about to construct a large railway repair and construction shop at Schweidnitz, Sileasia, Germany. Adjoining it is to be erected later a large factory for electric locomotives. Over 1,000 men will be employed in the repair shop alone. The construction cost is estimated at $1,500,000.

Steel Engineers Meet in Pittsburgh.

The regular monthly meeting of the Pittsburgh Section of the Association of Iron and Steel Electrical Engineers was held at the Seventh Avenue Hotel, Pittsburgh, Pa., Saturday evening, February 7, 1914, and was conducted by President Friedlaender.

After the dinner, E. H. Hewlett, General Electric Company, gave a very interesting lecture on the control apparatus to be used in operating the locks of the Panama Canal. The lecture was illustrated by lantern slides showing the details of the control apparatus, and by moving pictures showing the complete equipment in operation. The pictures showed plainly the working of the indicating devices used in connection with the control equipment. Mr. Hewlett also showed the operation of the water-level indicators.

The many conditions peculiar to the Canal Zone were related, such as making all metal parts of non-corrosive alloys, using mica insulation, and non-hygroscopic insulating compounds.

Meeting of the Institute of Radio Engineers.

At the regular meeting in New York City on February 4, Vice-President John Stone read a paper contributed by C. Tissot on "The Influence of Alternating Currents on Certain Melted Metallic Salts." This paper disclosed that certain metallic salts when properly subjected to a direct potential became materially better conductors and maintained their conductivity after a removal of the potential, and that radio or audio-frequency alternating potential then applied materially decreased the conductivity.

R. H. Marriott offered resolutions on the death of Clark H. Sphar, charter member, and engineer of the American Telegraph & Telephone Company, who died January 23, 1914.

At the Washington Section, February 5, Federick Kolster contributed a paper on "The Measurements of Logarithmic Decrements," including a description of his latest decrementer.

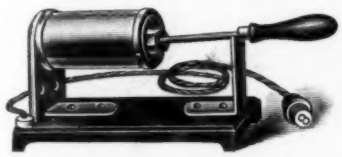
Electric Power Plant to be Built for Graz, Austria.

The city council of Graz, Austria, at a recent session decided unanimously on the construction, in conjunction with the city of Marburg, of a large water-power plant next the Felberinsel (island) on the Drave River near Marburg, for the operation of an overland central station by which the two cities and all towns and factories situated between will be supplied with electric power. The plant will yield 24,000 horsepower. The cost of construction is estimated at $2,400,000 to $2,800,000.

New Electrical and Mechanical Appliances

Electric Furnace for Heating Soldering Irons.

In order to permit electric heating of soldering irons without necessitating an expensive type of iron, the Current Electric Company, 18 East Kinzie Street, Chicago, has placed on the market a number of compact electric furnaces designed to be used for heating any type of standard soldering iron. One of these furnaces can serve for heating a number of irons, thus decreasing the initial cost of providing electric service for this purpose. The furnaces form a desirable load for a central station, since they add to the day load and, being used almost constantly, they have good load-factor. They will heat up an iron in a few minutes when the funace is already hot. The furnaces are well constructed and thoroughly insulated. They are made for connection to any regular 110-volt lighting circuit, to which they can be connected by a flexible cord and attachment plug. Their use removes the danger, delay and disagreeable features connected with the use of gas, oil or gasoline furnaces.



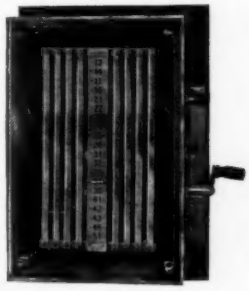
Electric Heater for Soldering Irons.

These furnaces are made in three sizes. The smallest is a round type, as shown in the illustration herewith; the power consumption is about 100 watts and this furnace will heat irons up to about one-half pound. The intermediate size takes irons up to three pounds and consumes about 350 watts. The larest size now made is suitable for heating irons up to four pounds and consumes 500 watts.

The Multi-Call System for Factories, Department Stores, Etc.

In factories, mercantile establishments and other large institutions there frequently is need for summoning quickly the superintendent, manager or other official who may be in any one of a number of departments or rooms. Of the systems developed for doing this promptly and effectively without disturbance, one known as the Multi-Call system is claimed by its manufacturer to be exceptionally compact and simple in construction, quick in operation and low in cost.

The Multi-Call is an automatic electric signaling device that is independent of any intercommunicating telephone system, although most commonly installed as an auxiliary to the same. In this case the compact calling device is placed adjacent to the private branch exchange board or center of the local telephone system. It can control any number of electric bells, buzzers, whistles, flashing lamps, etc., and provide a simple code signal for each official whose attention is desired. A special fire-alarm attachment is also provided by which instant alarm is given to all departments of the establishment. This is also used for calling fire drills that are now legally required in many parts of the country.



Multi-Call Instrument.

The equipment can be supplied with battery current or with direct current or alternating current from any line circuits up to 220 volts. This current is not used for operating the calling instrument itself, but only for operating the bells, buzzers, etc.; the current is governed, however, by a selector and mechanical relay in the instrument. The mechanism of the central instrument is operated by a powerful spring motor, always kept up to a certain tension. A very simple wiring system is used.

In calling a person it is necessary merely to move the indicating pointer opposite his number. By turning the operating key through a certain angle the spring motor is started to give the signal call one, two or three times. Signals for starting and stopping work can also be given by pushing an auxiliary button. A special switch can also be provided for operating the factory whistle.

For operating the fire alarm, the special fire-alarm switch is first pushed; this brings a special set of loud-ringing gongs into action that are not used except for fire alarm. The indicating pointer is moved to the number of the department where the chief danger exists and the operating key is turned; this notifies the fire department where the fire is located. Pilot lamps are provided to show whether the circuits are working properly.

The equipment briefly described above has been developed and placed on the market by the Multi Signal Company, 14 Harrison avenue, Boston, Mass.

A New Lag-Screw Type of Expansion Shield.

A new type of lag-screw expansion shield has been placed on the market

Lag-Screw Expansion Shield.

by the United States Expansion Bolt Company, 48 Dey Street, New York City. The particular feature of this little device is that it is adjustable so as to permit taking up or retightening fastenings which have worked loose through vibration or excessive strain. Within the shield is a special type of wedge nut which provides a powerful expanding force to the two halves of the shield. The latter has a corrugated outer surface which gives a strong gripping surface on the sides of the hole into which it is inserted. The little lug attached to the end of one part of the shield is merely for the purpose of preventing loss of the nut during shipment or before use.

In order to increase the expansion or tighten the fastening at any time one or two turns of the bolt head suffice. It is known that vibration or

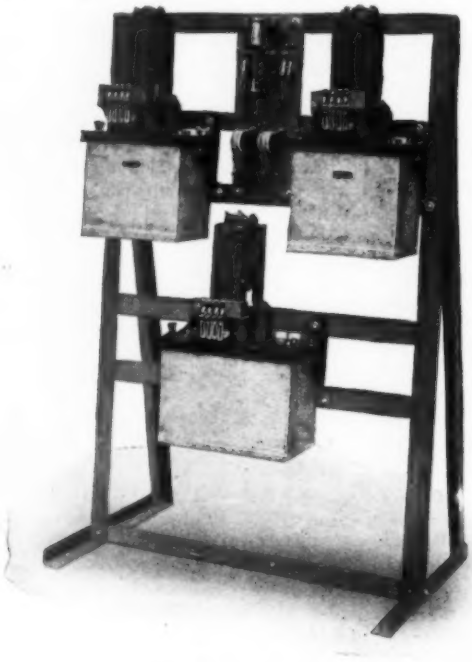
excess strain are apt to ream out the hole and loosen the hold of any expansion bolt. Therefore the adjustable feature of this lag shield is a valuable one that will be readily appreciated. On retightening the bolt head the fastening becomes as tight as it was originally.

The company is also continuing the marketing of several other types of expansion bolt which are slight modifications of the one shown herewith. One of these has a machine bolt and a closed-back shell. Another has a screw with a shell having four split segments on the four-way principle.

New Automatic Controllers for High-Voltage Squirrel-Cage Motors.

For centrifugal pumps and similar machines, squirrel-cage motors connected directly to 1100 and 2200-volt three-phase systems are used to a considerable extent. The use of motors operating at line distributing voltages is frequently desirable for a number of reasons and for the automatic starting of these high-tension motors a new line of self-starters has been designed by the Cutler-Hammer Manufacturing Company, of Milwaukee, Wis. These controllers are of the multiple-solenoid type, consisting of an angle iron, floor type, self-supporting frame, which carries the high-tension oil-immersed solenoid switches and necessary relays controlling the motor and autotransformer circuits.

The oil-immersed type primary and starting switches used are operated by single-phase solenoids. All contacts are entirely inclosed under oil, so that no live parts carrying 1,100 or 2,200 volts are exposed. Low-voltage current is used for the operation of the solenoid coils. The capacities of the standard types of these self-starters range from 20 to 300 horsepower, and they are made for both 25 and 60-cycle three-phase circuits. They can be automatically controlled when operating on an open-tank system by means of a float switch, and on a closed or compression-tank system by means of a gauge or diaphragm pressure regulator. For remote control from one or more points control stations can be employed so that the operator need only to push the button to start or stop the motor.



Automatic Controller for High-Voltage Induction Motors.

Electric Vibrator for Pattern Tapping in Foundry Service.

In making molds for casting, that stage in the molding work when the pattern is ready to be withdrawn requires that the pattern be carefully tapped on all sides, so as to free it from the sand at the same time that it is carefully guided and withdrawn from the mold. In a large casting, the latter operation requires almost the entire attention of the molder and for this reason various types of vibratory devices have been developed to relieve him of the burden of tapping the pattern. In molding machines such devices form a part of the machine and greatly facilitate the work.

The vibratory devices of this kind most generally used have been of the pneumatic type, which, although effective, have used a considerable amount of power, considering the small force needed in the actual tapping work, and they have also necessitated an expensive air-compressor equipment. The air hose and pipe being very subject to leakage, a great deal of power is wasted. To overcome these difficulties there has been developed an electric form of vibrator by the International Electric Tool Company, Fourth and Windlake Avenues, Milwaukee, Wis. This is a compact and relatively light-weight outfit, which, according to the statement of the manufacturer, takes less than one-tenth the power of a pneumatic vibrator. It can be supplied from a small generator, which will operate a large number of vibrators.

The vibrator itself is very simple in construction, since it consists merely of a solenoid with an iron frame. Within the solenoid is a steel plunger that moves back and forth, and when in operation practically floats in the axis of the coil, thus requiring no lubrication since there is substantially no wear. There is also provided a switch operated by a knee plate. The vibrators are made in several sizes and adapted for attachment directly to the pattern or for use with molding machines.

Dumore Vacuum Cleaner Used in Electric Vehicle.

The Dumore Electric Vacuum Cleaner.

A very handy type of electric vacuum cleaner has been developed by the Wisconsin Electric Company, Racine, Wis. It is known as the Dumore. This ap-

pliance is of compact construction and of relatively light weight, so that it can be readily handled by any person. It is practically an effective brush and is designed particularly for places where a handy appliance of this kind without cumbersome hose attached is necessary and in which the outfit is completely self-contained, requiring only a flexible cord for connection to any electric circuit.

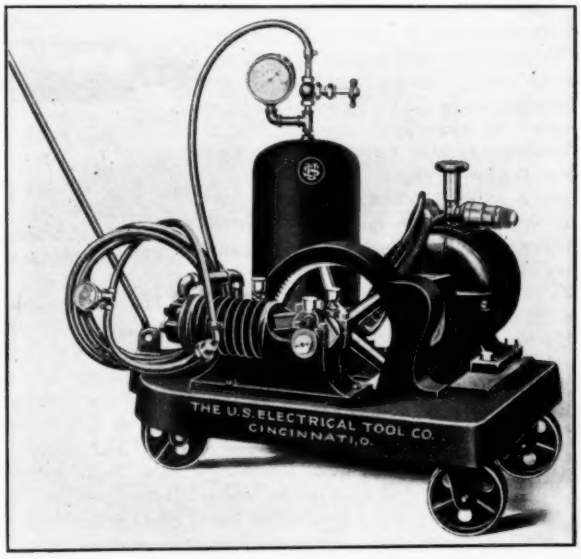
These cleaners are made for either direct-current or alternating-current and for any voltage. One form of these appliances that has been found of great value is made especially for use in cleaning the upholstery in electric vehicles, which it does thoroughly and rapidly without stirring up the dust in the unsanitary manner that a whisk broom does. This type of cleaner is also going into use by porters in hotels, barber shops and in Pullman cars, thus removing the very disagreeable cloud of dust usually experienced when a porter attempts to dust the clothing of patrons.

Dumore Portable Electric Vacuum Cleaner.

Another form of this appliance is used for cleaning live stock. It has been shown that disease among live stock is largely spread by germs. The dust and dandruff removed from the hair and skin of horses and cattle by the old-fashioned methods is invariably scattered into the air and becomes a source of contagion both to the attendant and the cattle. The cleaning of live stock by the new appliance is a very simple and easy operation, being made pleasant both for the operator and for the animal. A curry comb or brush attachment is used, neither of which revolves, vibrates or irritates. In all cases dust, dirt and dandruff are sucked into a small dustproof bag, where it is held until emptied at the convenience of the operator at some place where there is no danger from the dirt coming in contact with any animals or person liable to be infected thereby.

Motor-Driven Tire Pump.

The illustration herewith shows a new tire pump, suitable for public and private garages, which has been placed on the market by the United States Electrical Tool Company, Cincinnati, O. It is simple and compact in construction and, being mounted on a truck, it can be easily taken around the garage or outside to the curb. A tank 12 inches long by 6 inches diameter, into which the pump discharges, prevents condensation and oil from entering and injuring the tire. The pumping action is rapid, since a 35 by 4-inch tire can be pumped from flat to 70 pounds in one and one-half minutes. The motor is of Westinghouse make, one-quarter horsepower in capacity, and can be operated from the lighting circuit.



Motor-Driven Tire Pump.

Fig. 1.—Crossarm for Chicago Overhead Street-Lighting Circuits.

Arc-Lamp Brackets and Crossarms for Chicago Street Lighting.

In our issue of September 6, 1913, there was given an extended article describing the new electric street-lighting system of the city of Chicago. As pointed out in that article, the standard lamp equipment for use in practically all parts of the city consists of flaming-arc lamps mounted at a height of 22 or 25 feet above the street surface on steel tubular poles. In Fig. 2 herewith is shown a close view of the standard bracket used for supporting these lamps. As shown, it is of simple yet graceful design, including the city's emblem, the inverted Y. The upper portion of the bracket is a covered trough and includes a pulley at the pole end and also one over the lamp. Over these pulleys a steel rope passes, permitting the lowering of the lamp.

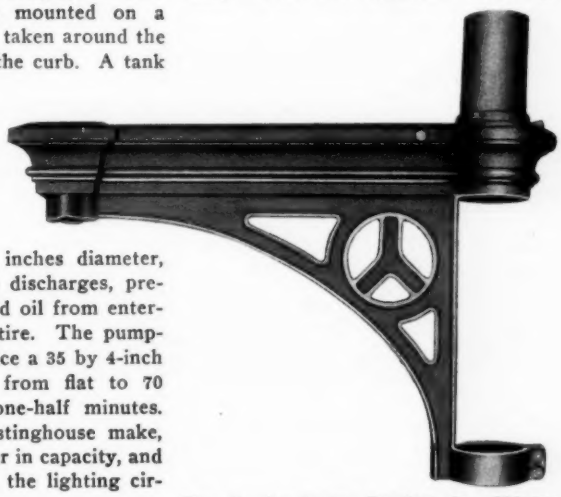


Fig. 2.—Arc-Lamp Bracket for Chicago Street Lighting.

The type of bracket shown is that used for outlying districts in which the circuits are carried overhead. Practically the same type of bracket is used

in the downtown district in which the circuits are carried underground and are brought up in protected cable through the pole and through the trough at the top of the bracket. In each case the bracket is slipped over the top of the pole and clamped securely thereto. The pole extension shown in the illustration is used for supporting the crossarm in the overhead construction.

A view of one of these crossarms is also shown. They are of malleable iron of T section, so as to combine great strength with minimum weight. These arms are made for two, four and six pins, steel pins with porcelain insulators being used. In each case they are clamped over the heavy extension shown in the upper part of Fig 2. Considerably over 8,000 brackets of the type shown in Fig. 2 or similar thereto have been used in the new street-lighting equipment for the city. The installation is being made by the Sanitary District of Chicago for and under the supervision of the Department of Electricity of the City of Chicago. The brackets and crossarms are being manufactured by the Line Material Company, South Milwaukee, Wis.

Solderless Connecting Terminals for Flexible Instrument Leads.

In testing rooms or laboratories where a large number of tests have to be conducted and convenience and time economy are therefore important, there has been need for a good type of terminal for instrument leads. The requirements of such a terminal are that it must make a perfectly tight and permanent connection from the electrical standpoint and that it must protect the insulation and adjoining portion of the cord from abrasion and breaking. A study of these needs has resulted in the development of a type of terminal specially designed for this purpose, which has been placed on the market by the Meliorate Manufacturing Company, 299 Taaffe Place, Brooklyn, N. Y. These terminal connectors consist of three parts; the outer insulating sleeve, the inner brass body and connecting sleeve and the terminal piece, which is screwed into the end of the brass sleeve and acts to clamp the wire.

In Fig. 1 these three parts are shown

Fig. 1.—Parts of Instrument-Lead Connector Ready for Assembling.

Fig. 2.—Wire Inserted in Binding Hole and Tightened.

and the first step in connecting the terminal is made clear. The wire is passed through the outer sleeve and through the hollow of the brass sleeve. The next step is to push the twisted and bent end of the wire through the transverse hole near the righ-hand end of the brass body, so that the wire projects a small amount through the lower portion of the binding hole. The terminal piece is then screwed into place, clamping the wire securely, as shown in Fig. 2. Finally the insulating sleeve is pulled over the brass sleeve,

Fig. 3.—Finished Terminal.

bending over the projecting ends of the wire strands and thus holding them against the brass. The completed terminal of the smaller pattern is shown full size in Fig. 3.

The outer insulating sleeve is made of a polished material which the manufacturer states will not chip, crack or break while in service; it is moisture-proof and unaffected by temperatures even up to 180 degrees centigrade; these outer sleeves are furnished in red and black colors so that they may be used to denote polarity. The inner body is of hard-drawn brass, which is nickel-plated. It accommodates the insulation of the wire with the outer sleeve and protects the brass from fraying or sliding back from the exposed part of the wire. It also reinforces the sleeve throughout its length.

The terminals are also of nickel-plated hard brass and are made in three forms, of which the type shown in the illustrations is suited for such testing work where the leads must be quickly changed from one instrument to another. Where a considerable longitudinal strain is apt to be placed on the leads, the slot is made at one side at right angles to the axis of the terminals; this prevents the terminal from slipping out and yet permits its ready removal. A third type of terminal piece is made round with a concentric hole in the center for fastening to a binding post of a laboratory type of instrument to which the instrument lead is more or less permanently fixed. Each of these types of contact face or terminal piece is interchangeable. Thus one pair of leads may be used for several different purposes without removing the body of the connector from the wire, it being necessary merely to change the terminal piece. When the outer sleeve is in place the wire cannot be removed and the contact face released. Thus the joint is not only electrically satisfactory, but is said to be a permanent one. This overcomes the difficulty of changeable resistance from soldered terminals in which the corrosive effects of soldering pastes or salts are liable to cause change in electrical conductivity.

Internal Asbestos Sheath for Economy Renewable Fuses.

In an article published in this journal on January 13, 1912, there was described the construction of the renewable cartridge fuses manufactured by the Economy Fuse & Manufacturing Company, Kinzie and Orleans Streets, Chicago. These fuses are made for 250 and 600-volt circuits and for a great many current capacities. They are made in both the ferrule and knife-blade types and in external appearance resemble standard cartridge fuses. Within the fuse, however, they have been ingeniously constructed so that the fuse element, which is of standardized size and shape for each rating, can be readily renewed on removing the end terminals, thus making a renewal of the fuse when it has blown at min-

Renewable Element for Ferrule-Type Fuse.

imum expense, since only the fuse element must be replaced and the outer shell and terminals can be used over and over. These fuses have been found to meet all standard requirements of rating and performance laid down for cartridge fuses. Experience with these fuses for several years has shown that since the cost of renewal with the proper fuse element is very low, they are properly renewed in actual service. They have, therefore, been the means

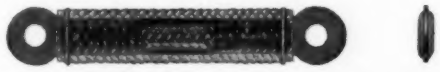
Renewable Element for Knife-Blade Fuse.

of practically eliminating the hazard introduced in standard non-renewable cartridge fuses from having such fuses renewed on the premises in an improper manner.

In the ferrule type fuses no filling material is placed around the fuse element. The fiber tubular casing connected with the end terminal construction is so designed as to provide an

indirect vent for the gases to escape when the fuse is blown. This restricted path for the gases causes them to be cooled before final exit and removes all danger of fire.

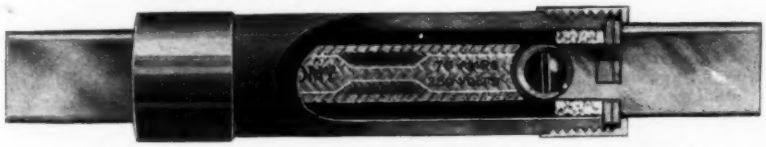
The knife-blade type of Economy fuse has recently been improved by using in place of the powdered asbestos filler that was formerly placed about the fuse element a sheath of woven asbestos which is slipped over the fuse link and fits it snugly, as shown in the accompanying illustrations. This sheath is made of long tough fibers of pure asbestos knitted into a braided tubing with a comparatively thin wall and with an inner opening of a size that will just permit easy insertion of the renewal link. This sheath tubing is cut to a definite length for each size of fuse and after being applied to the renewal link is secured thereto at the ends by means of a small fastener.



Side and End Views of Fuse Element with Asbestos Sheath.

Same After Short-Circuit has Disrupted the Fuse.

When the fuse is blown on moderate overload the fused metal of the link is confined within the sheath without distorting the shape of the latter. If the blowing of the fuse is due to a short-circuit, the violent explosion of gases produced by this causes the asbestos sheath to swell out and open the small interstices between its fibers. This relieves the gas tension within and yet confines the force of the explosion, so that the gases can slowly dissipate themselves through the vents at the ends of the fiber sheath without danger to the surroundings. At the ends of the fuse tubing a shredded asbestos packing is provided as an auxiliary to the venting feature. This acts like a screen and prevents flame from passing out through the interstices, as this is a well-known property of gauze structures. When a fuse has been blown on a short-circuit the asbestos sheath is rendered unserviceable for further use on account of its distorted and brittle condition, but a number of spare sheaths can always be obtained with the renewals of the fuse element.



Knife-Blade Fuse with Shell Cut Away to Show Internal Arrangement.

The manufacturer claims that the use of the asbestos sheath produces a fuse having greater uniformity in performance than fuses which employ a powdered type of filling material.

A New Ground-Locating Apparatus.

A new ground-locating apparatus is being put in service in New York City. It is of unique design and has been worked out by men in the operating department of the New York Edison Company, says *The Edison Weekly*. The principles of the apparatus, its construction and use are briefly as follows:

An alternating current of widely different fundamental frquency is superimposed on current of normal frequency. The different frequencies are readily distinguishable by means of a telephone receiver connected to an exploring coil or "rumbler" placed against the wire or cable carrying the currents. The apparatus consists of a dynamotor, the alternating-current end of which is wound for 220 volts at a frequency of 500 cycles. Two constant-potential transformers are used between the generator and the grounded circuit, so that the two parts of the outfit are connceted inductively only. The generator side of the outfit is grounded for protection. One side of the secondary circuit is grounded through a lamp bank. The other side of this circuit is brought through a lamp bank to an attachment for connection to grounded cable or wire. A make and break switch is used to make and break the test circuit periodically.

This outfit consists of a flasher driven by a small alternating-current motor, which does not actually break the circuit, but simply shunts the outside circuit. The outfit operates as follows: When a circuit becomes grounded it is put on a separate bus by the operator. The dynamotor is then started, and when up to voltage and speed the flasher outfit is started and the apparatus is then connected to the grounded cable. The high-frequency current having been sent out, a troubleman goes out on the circuit with a telephone receiver and exploring coil. By placing the exploring coil near the cable he will get one or two distinct sounds in the receiver, depending on his location in reference to the ground, the sound or note given by the 500-cycle test current, being of a much higher pitch, is very distinctive and quite easily picked out from the 60-cycle or working frequency. The high-frequency note prevails up to the point of ground and then ceases. The troubleman by making tests at points along the circuit is able to follow the note to the source of the trouble.

Convention of The Standard Paint Company's Sales Force.

The eastern sales force and office staff of The Standard Paint Company, after having been in convention for several days, wound up a most successful session at an informal banquet held at the Chemists' Club, New York, on Monday evening, December 29, 1913.

The feature of the evening was an address by Ralph L. Shainwald, president of the company, in which he explained that, besides being its organizer, he was the first salesman for the company, and told some interesting and instructive incidents of his early experience, which led to the great success of The Standard Paint Company's products.

In addition to the speech made by the president, interesting talks were also given by Herbert Abraham and H. A. Gillespie, assistant managers; J. H. Thomas, manager railroad department; C. E. Smith, manager paint and electrical department; H. A. Collins, eastern sales manager; W. F. Fairbrother, manager advertising department, and others.

As the convention of the eastern division adjourned in New York, the western contingent convened in Chicago.

After several days spent in the exchange of ideas and experiences, the high point was attained at a banquet in the Hotel Gladstone on Saturday evening, January 3.

William F. Pitts, western sales manager, made a most interesting and enthusiastic address, the keynote of which was optimism. W. F. Fairbrother also addressed the meeting on "Advertising and Salesmanship." Speeches were made by C. W. Dohm, superintendent Chicago Heights plant; Harry E. Smart, who travels in Ohio; W. H. Mullen, the Arkansas traveller, and others.

Life of Okonite Insulation.

The excellent life of Okonite insulation is attested in a letter written by the Commercial Cable Company, of New York City, calling attention to a cable laid about

13 years ago in New York Harbor between Coney Island and New York City. This cable was recently removed and the Okonite wire was found in excellent condition. The cable was again laid under the East River to Far Rockaway.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

ATTACHMENT PLUGS, Fuseless.—Harvey Hubbell, Incorporated, Bridgeport, Conn.

"Hubbell."

Edison type, 660 watts, 250 volts; catalog No. 5,915.

Approved January 6, 1914.

ATTACHMENT PLUGS, Fuseless.—Hotpoint Electric Heating Company, Ontario, Cal.

"Hotpoint," 660 watts, 250 volts.

This device consists of a standard Edison screw shell, porcelain body and black composition cap.

Approved December 27, 1913.

Attachment Plug.—Hotpoint Electric Heating Company.

CURRENT TAPS.—Chapman & Walker, Limited, submitters, 118 Richmond Street, West, Toronto, Can. Manufactured by The Sterling Telephone & Electric Company, Limited, Telephone House, 210 Tottenham Court Road, London, W., England.

Multiple wireless plug clusters, catalog Nos. A-497, A-498 and A-499.

Note.—Where, in addition to sockets or receptacles already installed, connections are desired on lighting circuits for portable lamps or for other special appliances requiring only small amounts of current, multiple current taps may be used, provided the total energy required in the circuit to which they are connected does not exceed 660 watts, and provided their use cannot under any conditions necessitate a departure from the requirements of Rule 23*d* of the National Electrical Code.

Current taps must not be used in key or pull sockets if the device controlled through such sockets requires more than 250 watts.

Approved January 12, 1914.

FIXTURES.—Thyge Nelson, 4200 Milwaukee Avenue, Chicago, Ill.

Cast-iron bracket and ceiling fixture intended for use on porches or where exposed to the weather.

Approved January 5, 1914.

HEATERS, Electric.—The Advance Machinery Company, 525 Hamilton Street, Toledo, O.

Electrical glue heater. Model "R-J," 108-115 volts, 300-70 watts.

In event of water in the jacket boiling away while the heater is turned "on," the casing rapidly attains a high temperature sufficient to ignite combustible material. With normal operation this heater when connected by approved fittings to a circuit of suitable capacity provides a relatively safe means of accomplishing the purposes intended.

Approved January 5, 1914.

HEATERS, Electric.—The Advance Machinery Company, 525 .Hamilton Street, Toledo, O.

Electrical glue heaters.

Model "A," 110-112 volts, 5.2 amperes to 20 amperes.

Model "R-A," 110 volts, 0.62 amperes.

Approved January 6, 1914.

LAMP GUARDS.—Benjamin Electric Manufacturing Company, 128 South Sangamon Street, Chicago, Ill.

"Benjamin."

Catalog No. 260-V.P.P., for use in garages or damp places.

Approved January 12, 1914.

RECEPTACLES For Attachment Plugs.—Connecticut Electric Manufacturing Company, Connecticut and Florence Avenues, Bridgeport, Conn.

"C. E. M. Co." flush receptacle and face plate, catalog No. 3,000, for use with approved Edison screw shell attachment plugs.

Approved December 27, 1913.

RECEPTACLES, Weatherproof.—The Arrow Electric Company, 630 Capitol Avenue, Hartford, Conn.

Porcelain base receptacles, 660 watts, 250 volts; catalog No. 62,358.

Approved January 6, 1914.

RHEOSTATS.—The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

"C-H" self-starters for 110, 220, 440 500 and 550 volts, alternating-current and direct-current elevator motors.

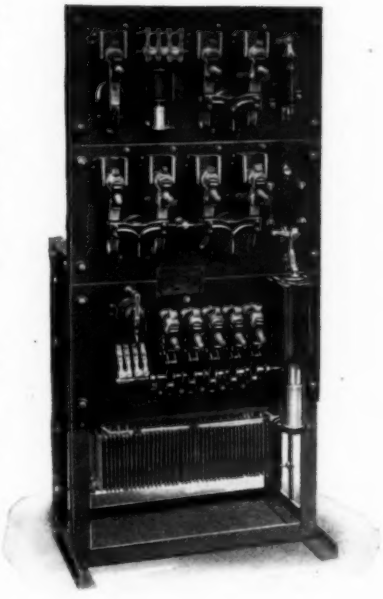
Bulletin Nos. 7,110, 7,120, 7,130, 1,140, 7,150, 7,160, 7,170, 7,180, 7,190, 7,200, 7,210, 7,225, 7,240, 7,250, 7,540, 7,550, 7,560, 7,568, 7,570, 7,572, 9,700, 9,720, 9,725, 9,730, 9,740, 9,745, 9,750, 9,760, 9,800, 9,810, 9,827, 9,828, 9,829.

Approved December 27, 1913.

SOCKETS, Weatherproof.—Pass & Seymour, Incorporated, Solvay, N. Y.

660 watts, 250 volts.

Porcelain shell, catalog No. 61,417.



Elevator Starter No. 7560.—Cutler-Hammer Manufacturing Company.

Standard for temporary outdoor use, and only when connected to stranded rubber-covered wires.

Approved January 6, 1914.

SWITCHES, Push-Button Flush.—The Hart & Hegeman Manufacturing Company, 342 Capitol Avenue, Hartford, Conn.

Catalog No. 3,176, 10 amperes, 125 volts, 5 amperes, 250 volts, for remote-control solenoid-operated apparatus.

Approved December 29, 1913.

SWITCHES, Surface Snap.—General Electric Company, Schenectady, N. Y.

"G.E," 600 volts.

Three-way, 3 amperes, catalog No. 89,596.

Approved December 23, 1913.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

MERRILL, IOWA.—Bonds for $3,500 have been voted for an addition to the electric light plant.

CANTON, ILL.—The Council plans to place the wires underground. Address the city clerk for particulars.

FARRAGUT, IOWA.—The Commercial Club has started a movement for electroliers on the business streets. C.

SAN RAFAEL, CAL.—Bids have been called for the installation of 97 electrolier posts on Fourth Street.

WARREN, IND.—The town Board contemplates improving the electric light plant. Address the clerk of the board.

DECATUR, ALA.—The Alabama Power Company is contemplating the building of a big power plant in Decatur.

DECATUR, NEB.—Bonds have been voted for the construction of an electric-light system here. Address the city clerk.

PADUCAH, KY.—The Board of Public Works is considering the construction of an electric light plant at a cost of $16,500. G.

STEWARTVILLE, MINN.—$15,000 in bonds will be issued for the erection of an electric light plant. Address the city clerk.

WALLOWA, ORE.—L. A. Reinaman has been employed by the City Council to estimate the cost of a municipal electric light plant.

DRESDEN, TENN.—$27,000 in bonds have been voted for a light and water system. Address R. L. Suddath, mayor, in regard thereto.

SANTA BARBARA, CAL.—The Santa Barbara Gas & Electric Company proposes to extend its electric system to Carpinteria and Goleta.

ANDERSON, S. C.—Walhalla Light & Power Company has been incorporated with a capital of $10,000 by William H. Strother and Jesse W. Bell.

BUFFALO, IOWA.—A committee has been appointed to secure estimates for a municipal lighting plant. Address LeRoy Eggers for particulars.

WOONSOCKET, R. I.—A petition has been presented to the city government asking for better lighting facilities on the streets in the business section. W.

CLEVELAND, O.—The Council recommends placing 14 miles of wire underground each year. Address Public Service Director W. J. Springborn.

EASTON, MD.—This town is planning to construct an electric light plant here; $30,000 in bonds will be issued. Address the town clerk for information.

JACKSON, TENN.—This city is considering issuing $25,000 in bonds for the purpose of building a power house and extending its electric light system. G.

PARKER, S. D.—The Council plans to establish a municipal lighting plant. Address the city clerk for information.

WATERTOWN, MINN.—The Crescent Electric Company has been incorporated with a capital of $50,000 by Guy E. Halgren, James J. Ponsford and others. C.

RICHMOND, IND.—The Richmond Light, Heat & Power Company is planning a bond issue for the purpose of financing the purchase of additional equipment. G.

TALLAHASSEE, FLA.—$45,000 in bonds has been voted for the enlarging and improving of the electric-light plant and for other purposes. Address L. M. Lowery, mayor.

PERHAM, MINN.—The Council is considering employing an expert to go over the electric plant, with a view to making improvements and installing modern equipment. C.

HAZARD, KY—The Hazard Light & Power Company, which recently increased its capital stock from $15,000 to $30,000, will spend $10,000 in the installation of additional equipment. G.

TOLEDO, O.—The East Side Commercial Club is considering ways and means to extend the electric lighting on Second street. Address the secretary in regard to this improvement.

GRAND FORKS, N. D.—Efforts are being made to have the "White Way" lighting system extended on Bruce avenue, Fourth and Fifth streets. Charles J. Evanson is city auditor. C.

CADIZ, KY.—George L. Smith, manager of Cadiz Water Company, will purchase electrical equipment for the purpose of utilizing current from a water-power plant of A. P. White & Company.

ATLANTIC, IOWA.—It is more than likely that the Rock Island, if it installs its own water-pumping plant here, will also install its own lighting plant. Address F. J. Glover, city engineer, Chicago.

AUSTIN, MINN.—Farmers east of here are urging the City Council to extend the lighting system eight miles east to furnish them with lights, with a probability of extending it later to Dexter. C.

SCOTTSBURG, IND.—The Indianapolis & Louisville Traction Company is considering providing a street lighting service in Scottsburg, it is reported, a franchise now being before the City Council. G.

CORVALLIS, ORE.—The committee appointed by the Commercial Club here a short time ago to estimate the cost of installing a power plant and distributing system for this city, reports that it will cost $111,570.

SEGUIN, TEX.—The City Council has ordered an election for February 19 on the proposition of issuing $20,000 of bonds, $12,500 of which will be used in enlarging and improving the water and electric light plants. D.

COTULLA, TEX.—The City Council has granted a 25-year franchise to E. B. Zachry for an electric light plant. Construction work will be started within 90 days, and the plant must be in operation within a year. D.

JOHNSTOWN, PA.—The Citizens Light, Heat & Power Company will build a transmission line from Johnstown into Echo in the early part of next spring, or as soon as the new Brookdale-Echo road is completed.

SEATTLE, WASH.—The plant of the Washington-Oregon Corporation at Kalama was destroyed a short time ago by fire, incurring a loss estimated at $45,000. The plant will be rebuilt, according to officers of the company.

HANOVER, IND.—The Hanover Lighting Company is being organized for the purpose of building a street lighting system. Current for its operation will be secured from the Madison, Ind., Light & Street Railway Company. G.

WEST WARWICK, R. I.—Business men of this town are agitating for improved street lighting. The present equipment consists of 495 small incandescent units, for which the current costs the town $12 per lamp per year.

SPRINGFIELD, MASS.—The City Property Committee is considering the project of procuring generating apparatus to manufacture electricity to light the municipal buildings. An estimate will be prepared on the cost of the installation.

BRYAN, TEX.—The Bryan Commercial Club is promoting a project to erect a municipal power plant costing $30,000, to furnish power for the Bryan-College Station interurban, which it is proposed to electrify, and for city street lighting. D.

WYNDMERE, N. D.—The Commercial Club has taken up the proposition of securing electric lights for this town. It is proposed to extend the Ottertail Light & Power Company's line from Wahpeton through Mooreton and Barney to Wyndmere. C.

HIBBING, MINN.—The village of Kitzville has granted a franchise to the Chisholm Electric Light Company to erect poles and wires in the village for the sale of current. John Meadows, president of Kitzville Council, may be addressed. C.

PROVO, UTAH.—A. P. Merriall, local manager of the Utah Light & Power Company, appeared before the County Commissioners and submitted a tentative plan for better lighting on the principal streets. The plan includes the installation of 50 arc lights.

EAST PITTSFORD, VT.—Plans for a 6,000-horsepower hydro-electric development here are fast being matured. The Rutland Railway, Light & Power Company will utilize the waters of the Chittenden storage basin, where a billion cubic feet of water is impounded. W.

CANTON, O.—O. C. Barber, of Barberton, announces that he intends to establish an electric light and power plant in this city, which will compete with the Canton Electric Company. Members of

the City Council have said they would grant him a franchise.

CASHMERE, WASH.—The Cashmere Water Power Company has announced it will develop 2,500 horsepower near the town of Cashmere. The directors of the company are A. J. Mills, L. H. Titchenal, E. F. Stowell and O. B. Hallis, of Spokane, who is secretary.

KENTON, O.—The Hardin Wyandotte Lighting Company has decided to remodel the old plant between South Main and South Detroit streets, according to P. M. Magley, general manager. New machinery will be installed and improvements costing $40,000 will be made.

DENISON, TEX.—It is announced by President J. K. Strickland, of the Texas Power & Light Company, that a large power plant will be erected by the company near Denison, but on the Oklahoma side of the Red River. It is planned to have the plant in operation early in 1916. D.

ESTHERVILLE, IOWA.—At a recent meeting of the City Council, W. H. Grover, an expert from Ames, was employed to examine the electric light system here and prepare data for the entire reconstruction of the plant. Owing to the growth of the city, the plant is inadequate.

JOPLIN, MO.—Application has been filed by the Empire District Electric Company with the Public Service Commission for authority to issue $120,000 general-improvement bonds. The proceeds would be expended in making betterments at various points served by the company.

BELLINGHAM, WASH.—J. H. Bloedel, president of Bloedel-Donoval Mills Company, owner of one of the largest lumber mills on the coast, has announced that the plant will be electrified at a cost of $60,000, and that contracts for the machinery will be awarded during the month of February. O.

PRINCE RUPERT, B. C.—The Star Electric Light & Power Company, J. P. Puckett, manager, recently filed articles of incorporation in this city, with a capital stock of $10,000. The company proposes to construct and operate electric lines for light and power purposes. For further information address J. N. Shaver, secretary. O.

TANANA, ALASKA.—The Tanana Gold Fields Company has in view a plan to start an electric plant near the properties in the Tanana gold field region, to transmit power to its properties and to the Fairbanks district and vicinity. Address John L. Timmons, of Fairbanks, Alaska, for general information.

GRAND CANYON, ARIZ.—J. Bishop & Company, platinum manufacturers of Malverne, Pa., who have taken 10 of the 40 platinum claims of Ralph H. Cameron in the Grand Canyon of the Colorado River near Bright Angel trail, will erect a generating plant on Indian Garden Creek to furnish power for a 100-ton reduction plant to be erected nearby.

ESCANABA, MICH.—It is understood that during the coming year the Escanaba Traction Company will build a new power dam on the Escanaba River, two miles from the city limits. The traction company has applied to the State Railroad Commission for authority to issue $225,000 worth of bonds. Address John K. Stack, president, for further information.

LOUISVILLE, KY.—The Swiss Cleaners and Dyers are having plans for a $50,000 plant drawn by D. X. Murphy & Brother, architects of this city. The plant will be electrically operated, the company generating its own current. A 60-kilowatt generator, as well as a corresponding horsepower in motors, will be purchased. Dr. H. E. Mechling is general manager. G.

JACKSON, TENN.—The Jackson Railway & Light Company will purchase a rotary convertor in the near future, having decided to improve and enlarge its power plant. John Wisdom is superintendent. The company is also in the market for construction material, with the exception of rails, for an extension of its traction line, which it plans to build in a few months. G.

WEAVERVILLE, CAL.—The Hardscrabble Mining Company, whose property is near here but whose headquarters are in Los Angeles, is making many improvements to its property and many more are in prospect. The company intends installing an electric power plant, stamp mill, machine drills and other equipment during the coming summer. John Nefroney is general manager of this company. T.

OLEAN, N. Y.—It is understood that negotiations are under way by Supervisor Charles B. Nichols, of Ischua; President Joseph B. Mayer, of the Olean Electric Light & Power Company, and other officials of the lighting company, in regard to the construction of an electric power transmission line from Hinsdale along the Buffalo-Olean highway to Ischua and Franklinville.

WORCESTER, MASS.—W. Emory Wardwell has completed the incorporation of the Tennessee Valley Light & Power Company under a Massachusetts charter. The new corporation is the consolidation of several companies in the Tennessee Valley near Chattanooga. These companies carry on business in 15 towns. The capital of the new corporation is named at $1,100,000. The company will furnish both power and light for several cotton mills, lumber mills, foundries and iron mills. Mr. Wardwell is secretary, vice president and director of the new company.

ASHEVILLE, N. C.—Developments of far-reaching importance to Western North Carolina are presaged by the reorganization yesterday of the Toxaway Power Company, a corporation chartered about a year ago with an authorized capital of $1,500,000. When the company was charted the incorporators were H. S. Mitchell and W. E. Moore, of Pittsburgh, and George H. Wright, of Asheville. The new company owns or controls extensive water rights and property in Western North Carolina and it intends to develop power projects along the Toxaway River in Transylvania County, the Green River and other streams.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

WEBSTER, S. D.—Webster Telephone Company is considering rebuilding its system. C.

BALLATON, MONT.—Riverside Telephone Company will extend its lines into this place at once. C.

BARODA, MICH.—The Baroda Telephone Company has been incorporated with a capital stock of $25,000.

CARDINGTON, O.—The Farmers' Mutual Telephone Company has been incorporated by M. D. Miller and others.

ALAMEDA, CAL.—The Pacific Telephone & Telegraph Company has been granted a 20-year franchise in this city.

HOMERVILLE, GA.—B. A. Harvey has purchased the telephone system from H. J. Dame and will improve and extend it.

SPOONER, MINN.—A co-operative telephone line will be built along the state road to Loman. Address V. E. Lindholm for particulars.

CUMBERLAND, WIS.—The McKinley Telephone Company will improve its plant here. Address E. J. Pfluger, secretary, for information.

PALMER, IND.—Palmer Telephone Company has been incorporated with a capital stock of $2,000 by G. W. Mehrling, J. W. Smith and G. F. Claussen.

PANORA, IOWA.—The Panora & Jefferson Road Mutual Telephone Company has been incorporated, with S. H. Orr as secretary. The capital is $10,000. C.

SEQUIM, WASH.—The Sequim Mutual Telephone Company has been incorporated with a capital stock of $5,000 by E. Roberts, Lou Goldschmith and P. A. McNamara.

ST. JOHN, WASH.—St. John Cooperative Telephone & Telegraph Company has been incorporated with a capital stock of $6,000 by Walter Black and H. M. Halstead.

PORT HURON, MICH.—The local telephone company will expend $30,000 in improvements. A new exchange will be erected. Address Manager Barry for desired information.

CENTRALIA, WASH.—The South Hannaford Farmers' Telephone Company has been incorporated by Isaac M. Pollack, Fred Buchanan, William J. Merriman and F. R. Lobdell.

HARRIETVILLE, O.—The Harrietville Telephone Company has been incorporated with a capital stock of $350 by W. R. Martin, Charles Miller, N. F. Schott and Jacob Kimmach.

RICHLAND, WASH.—The Richland Telephone Company has been incorporated with a capital stock of $5,000 by E. E. Floyd, J. R. Gardner, William Reed and John Erickson.

CENTRALIA, WASH.—Mary E. Hoffman, of Chehalis, has been granted a franchise to erect a telephone line over certain roads from Stearns Creek to Adna, and from Adna to Bunoer Siding.

SCOBEY, MONT.—The Moore Telegraph & Telephone Company, of which R. G. Moore, Glasgow, is president, will begin in the spring building lines into this place and Opheim. An exchange building will be erected here. C.

PALACIOS, TEX.—W. H. Dean, of this city, has stated that he has sold his telephone business in Palacios to the Port Lavaca Telephone Company. The new owner proposes to extend the line and improve the service generally.

MARSHALL, MICH.—The Street Committee of the Council has decided to make a report favoring the laying of all telephone, telegraph cables and wires underground in the business district. Address the city engineer in regard to this matter.

TEMPLE, TEX.—The Southwestern Telegraph & Telephone Company has made an appreprition of $18,000 to be expended in this city during the present year in underground conduit service, and plans are now being formulated for the work. Address the secretary.

ELECTRIC RAILWAYS.

(Special Correspondence.)

FORT WAYNE, IND.—Grant and Foote are interested in the proposed electric road to extend from Ft. Wayne to Goshen.

HOOPPOLE, ILL.—Plans are under way for the extension of the Tampico Hooppole Electric Railway for a distance of 15 miles. Address George Mathes, of Hooppole.

STOCKTON, ILL.—Local capitalists are interested in a project to build an electric railroad from Lancaster, Wis., to Stockton, through a region now untouched by either steam or electric lines. Address Fred E. Hammond for particulars.

DENVER, COLO.—The Chamber of Commerce and other civic bodies in Colorado Springs, Pueblo and Denver have been asked to co-operate in the construction of an electric line connecting the three cities, a total length of 115 miles. Frank R. Dusen, of Denver, represents the promoters,

HAGERSTOWN, PA.—Plans for a proposed electric railroad to connect Harrisonburg and Winchester, Harper's Ferry, W. Va., and Frederick and Hagerstown, by way of the Shenandoah Valley, are progressing rapidly, according to reports. The road will be continued into Washington eventually.

ARDMORE, OKLA.—F. B. McElroy, president of the Ardmore & Western Interurban Company, announces that his company will build a line connecting the Healdton fields with the Ringling road, a distance of about eight miles, and that this will be the beginning of an interurban system in the country.

HAMILTON, ONT.—The proposed electric line from Hamilton to Watertown, through Guelph, to a point on the Georgian Bay, is being agitated, some of those interested being Mayor Carter, J. W. Lyon, Alderman Hannigan and R. Symmers, all of Guelph. The opinion was that the line should be built and that the project should be taken up with the Hydro-Electric Commission.

FAYETTEVILLE, TENN.—Representatives of the proposed Franklin, Shelbyville & Fayetteville interurban are asking a subscription of about $68,000 to bring this road to Fayetteville. The proposed Tennessee & Alabama Railroad representative will ask a subscription of $75,000 from Lincoln County, Tenn., and a like amount from Madison County, Ala., for this road, which, it is said, will be a steam line, operating electric storage battery cars for passenger service. This road would connect with the Southern Railroad at Huntsville, Ala.

SANTA ROSA, CAL.—Electric railroad development is interesting northern Sonoma at the present time. Arthur D. Bowen, who promoted and financed the Santa Rosa and Petaluma Electric Railroad some years ago, is interesting capital to build an electric system to radiate from the city of Healdsburg and traverse the wonderfully productive and thickly populated Dry Creek Valley, Alexander Valley and Geyserville and nothern parts of the county, thus opening up with better transportation facilities a big section of country.

TORONTO, ONT.—George E. Smith has completed the purchase of the complete rights to the charter, franchises and other property of the Eastern Ontario Electric Railway Company, a new corporation which proposes to build an electric line across the southern line of the Province of Ontario, Canada. The railway company is chartered to build a line from Toronto to Cornwall, at the eastern extremity of Ontario, with a branch from Brockville to Ottawa, the whole being 376 miles long. It touches 52 cities and towns en route. The company has authority to capitalize at about $16,000,000. The charter provides the right to conduct a railway with any motive power except steam, to carry passengers, freight, mail and express and to manufacture and sell electricity for light, heat and power.

PROPOSALS.

LIGHTING SYSTEM.—Bids will be received until February 16 by the Board of Supervisors, Los Angeles, Cal., for the installation of a lighting system in the Moneta lighting district.

ELECTRICAL EQUIPMENT.—Bids will be received February 16 for the furnishing of electrical equipment for the improvement of the municipal light and water plant, Springfield, Ill. Address Arthur M. Morgan, consulting engineer, First National Bank Building, Chicago.

RADIO SET.—Sealed proposals will be received at the office of the Chief Signal Officer, War Department, Washington, D. C., until February 16 for furnishing under Proposal 688 one radio set, one-kilowatt, 500-cycle, quenched-spark type, complete. For further information address Charles S. Wallace, Captain, Signal Corps, U. S. Army.

WIRING AND LIGHTING.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until February 24, for changes in the conduit and wiring and lighting fixtures in the post-office at Buffalo, N. Y., in accordance with drawings and specifications, copies of which may be obtained from the custodian of the site or the office of the Supervising Architect.

LIGHTING FIXTURES, ETC.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until March 11 for furnishing the lighting fixtures for the post office at Osage City, Kans.; and until March 13 for the lighting fixtures for the post office at De Soto, Mo.; and until March 14 for the same for the post office at Bainbridge, Ga. Drawings and specifications may be obtained from the custodians of the sites or the office of the Supervising Architect.

ELECTRICAL SUPPLIES.—Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until March 3 for furnishing 15 portable electric drills, 125 volts, two speeds, as per Schedule 6390, and 20 telegraph hand keys for radio transformer, as per Schedule 6383, for delivery at the Navy Yard, Brooklyn, N. Y.; one 72-cell storage battery, complete, and 20 gallons of electrolyte, as per Schedule 6371, and 14,500 feet of rubber-covered duplex lighting and power wire, as per Schedule 6386, for delivery at the Navy Yard, Brooklyn, N. Y.; four ringing dynamotors and two telephone motor generators, as per Schedule 6371, for delivery at the Navy Yard, Camden, N. J.; 30 miscellaneous telephone jacks, two telephone switchboards, miscellaneous telephones, as per Schedule 6371, for delivery at the Navy Yard, Quincy, Mass. The Bureau will also receive bids until March 10 for one electric dynamotor, with controlling panel and leading rheostats, as per schedule 6361, for delivery at the Navy Yard, Annapolis, Md.

NEW INCORPORATIONS.

NAUGATUCK, CONN. John L. Russell Manufacturing Company has been incorporated, capitalized at $15,000, to manufacture lighting fixtures.

WILMINGTON, DEL.—Southern Timber & Power Company has been incorporated with a capital stock of $100,000 to acquire lands and improve the same.

SUPERIOR, WIS.—Articles of incorporation have been granted to Riley S. Hartley Company, capitalized at $5,000, to do a general electrical business.

LOUISVILLE, KY.—The Standard Lighting & Heating Company has been incorporated with a capital stock of $1,000 by T. C. Vance, C. H. Franklin and others.

PORTLAND, ORE.—Articles of incorporation have been filed by the Kingery & Marrs, Incorporated, capitalized at $15,000. The incorporators are J. D. Marrs, R. C. Kingery and J. F. Barrett.

WEEDSPORT, N. Y.—Economy Telephone & Telegraph Company, Incorporated, has been incorporated with a capitalization of $9,000, by George R. Nash, Daniel S. Gibbons and J. N. Mills, all of Weedsport.

BENNINGTON, OKLA.—A charter has been issued to the Bennington Light, Ice & Power Company, capitalized at $5,000. The incorporators are H. S. Clark, W. S. Murphy and J. S. Dawson, all of Bennington. P.

CLIFFWOOD, N. J.—The Atlantic Electric Company has been incorporated with a capital of $250,000 to operate as electricians and in electrical supplies. T. D. Finizio, L. Biondi and Bradford A. Turcott are the incorporators. A.

RAMSEN, N. Y.—Ramsen Telephone Exchange Company, Incorporated, has been incorporated with a capital stock of $5,000 by Roscoe C. Critchard, Steuben N. Y.; Owen J. Griffith and Frank Y. Sanborn, both of Remsen.

MANHATTAN, N. Y.—Engineering Utilities Corporation has been incorporated with a capitalization of $10,000 by Roland Rasquin, Maurice D. Waller and Frederick Monckmeyer. The company will deal in and manufacture electrical supplies.

NEW YORK, N. Y.—National Lighting Fixture Manufacturing Company, Incorporated, has been incorporated to manufacture electric light and gas fixtures by Ben Kaplan, Albert Etepfer and Louis C. Kurchenoff, of New York City. The capital stock of the company is $10,000.

NEW YORK, N. Y.—The United Gas & Electric Engineering Corporation has been formed with a capital stock of $100,000, all of which has been purchased for cash at par by the United Gas & Electric Corporation. The new company will carry on a general consulting and contracting engineering business and will give such service as may be required by the operating companies of the United Gas & Electric Corporation, and its subsidiary, the American Cities Company. The new company also will engage in the purchase of equipment, supplies and material of all kinds, and has taken over the purchasing department of the United Gas & Electric Corporation. Gearge Bullock is president; S. J. Dill and J. S. Pevear, vice-presidents; and B. F. Wood, chief engineer.

FINANCIAL NOTES.

The annual meeting of the Kings County Electric Light & Power Company will be held February 24.

The Pennsylvania Water & Power Company has sold to the Fidelity Trust Company, of Baltimore, $680,000 five-per cent first-mortgage bonds, to be offered to the public around 93.

The Consolidated Gas, Electric Light & Power Company, of Baltimore, is offering to stockholders for subscription at par, in the proportion of one share of the new stock to each 10 shares of the old stock, the $1,416,000 of stock recently authorized by the Maryland Public Service Commission. Rights of subscription accrue to stockholders of record February 16.

At the annual meeting of the Narragansett Electric Light Company former directors and officers were re-elected and the stockholders approved an increase in the capital of the company from $6,000,000 to $7,500,000. Whether the new capital will be issued in the form of convertible debentures or capital stock, as well as the time of issue, will be decided later by the board. The new debentures or stock will be sold at not less than par, the par value of the shares of stock being $50.

Plans have been completed for the merger of the Twin City Traction Company, of Dennison, Ohio; the Midland Power & Traction Company, of Cambridge, Ohio; the Coshocton Light & Heat Company, of Coshocton, Ohio; and the Lafayette Light & Power Company, of Uhrichsville, with the Ohio Service Company, which will result in the immediate improvement of the light and power service in Dennison and Uhrichsville. The Ohio Service Company will start work in a few weeks on the erection of a transmission line from Coshocton to Uhrichsville and Dennison.

The Utah Power & Light Company has sold $10,000,000 first mortgage five per cent bonds, dated February 2, 1914, and due February 2, 1944. These bonds are part of an authorized issue of $100,000,000, of which the present amount is the first that have been sold. Proceeds from the present issue will be used to retire such portion of the approximately $22,000,000 six per cent ten-year notes of the Utah Securities Corporation, now outstanding. Tenders for these notes will be asked to such an amount as the proceeds of these bonds will purchase. The Utah Power & Light Company, with its subsidiary, the Western Colorado Power Company, is the operating company of Utah Securities Corporation.

The combined statement of the electric railway, lighting, gas and water-power companies under the control of the Stone & Webster Management Association for the year ended December 31 shows a total capitalization outstanding of $186,515,400, consisting of $86,512,100 bonds and coupon notes, $38,092,100 preferred stock and $61,911,200 common. The combined earnings for the year were $26,688,521 gross and $11,104,764 net. There was a balance after all charges of $6,195,340, of which $4,184,476 was distributed in dividends, leaving $2,010,863 for reserves and depreciation. The total disbursements for the year 1913 for interest on bonds and notes and for dividends amounted to $8,616,581.

The Columbus Railway, Power & Light Company has taken over the operation of the public utilities of Columbus, Ohio, which heretofore have been operated, under lease, by the Columbus Railway & Light Company. The new company is a consolidation of the underlying properties and not a leasing company, the leases, with the exception of that of the Columbus Light, Heat & Power Co., having been cancelled. The board of directors of the new company is made up of men selected from the boards of the old companies. Its officers are S. G. McMeen, president; C. M. Clark, vice-president; E. K. Stewart, vice-president and general manager; P. V. Burington, secretary; H. W. Clapp, general superintendent.

New officers of the Federal Light & Traction Company were elected, February 4, at a meeting held at the company's offices, 60 Broadway, New York City. The revised list of Federal officials follow: E. N. Sanderson, president, in place of James C. Colgate, resigned; Francis Blossom, vice-president, was elected in place of C. C. Chappelle, who continues to act as general manager; Craig Colgate was re-elected vice-president; H. Hobart Porter was again elected secretary; L. C. Gerry was re-elected treasurer, and elected assistant secretary; J. B. Marsh was re-elected assistant secretary; Richmond Talbot was elected to fill the position of assistant treasurer, a vacancy being caused by resignation of Harvey N. Wadhams; Francis Blossom was elected a director in place of Parmely Herrick, resigned. At the annual meeting of stockholders held prior to the directors' meeting, the treasurer submitted his report upon which a regular quarterly dividend of one and one-half per cent was declared on preferred stock, payable February 28 to stockholders of record February 14.

Dividends.

American Telegraph & Cable Company; quarterly of 1.25 per cent payable March 1.

Detroit United Railways; regular quarterly of 1.5 per cent, payable March 2 to stock of record February 14.

Federal Light & Traction Company; the regular quarterly dividend of 1.5 per cent on the preferred stock, payable February 28, to stockholders of record February 14.

Kings County Electric Light & Power Company; regular quarterly of two per cent.

Northern Texas Electric Company; the regular semi-annual dividend of $3 a share on its preferred stock and a quarterly dividend of $1.75 a share on its common stock, both payable March 2, to stock of record February 14.

Ontario Power Company; quarterly of 1.25 per cent, payable March 2 to stock of record February 21.

Pacific Gas & Electric Company; regular quarterly of $1.50 on preferred, payable February 16 to stock of record January 31.

Portland Railway Light & Power Company; $1, payable March 2 to stock of record February 12.

Twin City Rapid Transit Company; regular quarterly of 1.5 per cent on common and 1.75 per cent on preferred, payable April 1 to stock of record March 14.

Reports of Earnings.

CHATTANOOGA RAILWAY & LIGHT.

	1913.	1912.
December gross	$ 100,378	$ 95,454
Net after taxes	39,604	38,369
Surplus after charges	13,490	14,406
Twelve months' gross	1,204,928	1,064,674
Net after taxes	487,303	430,058
Surplus after charges	189,221	164,029
Balance after preferred dividends	89,221	64,029

MT. WHITNEY POWER & ELECTRIC.

Mt. Whitney Power & Electric Company reports for the year ended December 31, 1913, as follows:

	1913.	1912.
Gross earnings	$526,852	$445,826
Expenses and taxes	256,456	218,787
Net earnings	306,395	227,038
Interest charges	129,900	109,500
Surplus	176,495	117,538

PORTLAND RAILROAD CO.

	1913.	1912.
December gross	$ 79,867	$ 76,693
Net after taxes	28,810	16,446
Surplus after charges	5,312	6,193
Twelve months' gross	1,036,316	981,052
Net after taxes	346,840	305,458
Surplus after charges	*165,959	184,291

*Equivalent to 8.3 per cent on capital stock.

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY.

	1913.	1912.
December gross	$ 50,420	$ 47,359
Net after taxes	13,302	15,073
Surplus after charges	*2,036	673
Twelve months' gross	675,554	618,039
Net after taxes	247,829	228,487
Surplus after charges	68,264	55,413
Balance after preferred dividends	32,264	19,413.

*Deficit.

AMERICAN GAS & ELECTRIC.

The earnings of six subsidiaries of the American Gas & Electric Company for the year ended December 31, 1913, compare as follows:

	1913	1912
Canton Electric:		
Gross earnings	$418,643	$347,248
Net after taxes	208,632	175,201
Surplus after charges	147,389	118,416
Marion Light & Heating:		
Gross earnings	$257,041	$225,332
Net after taxes	118,326	83,204
Surplus after charges	72,504	48,765
Muncie Electric Light:		
Gross earnings	$456,365	$389,169
Net after taxes	194,477	166,080
Surplus after charges	109,065	84,754
Rockford Electric:		
Gross earnings	$464,669	$417,318
Net after taxes	245,235	202,826
Surplus after charges	148,868	108,399
Scranton Electric:		
Gross earnings	$932,766	$803,071
Net after taxes	576,383	448,910
Surplus after charges	376,467	297,963
Wheeling Electric:		
Gross earnings	$312,115	$257,639
Net after taxes	150,914	117,408
Surplus after charges	82,645	58,432

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Feb. 9	Feb. 2
American Tel. & Tel. (New York)	121	123
Commonwealth Edison (Chicago)	136	133½
Edison Electric Illuminating (Boston)	255	257½
Electric Storage Battery common (Philadelphia)	54	51¼
Electric Storage Battery preferred (Philadelphia)	54	51¼
General Electric (New York)	146	147
Kings County Electric (New York)	120	120
Manhattan Transit (New York)	1⅛	1¼
Massachusetts Electric common (Boston)	10½	12
Massachusetts Electric preferred (Boston)	62	63½
National Carbon common (Chicago)	155	155
National Carbon preferred (Chicago)	111	116¾
New England Telephone (Boston)	140½	139½
Philadelphia Electric (Philadelphia)	26⅝	26¼
Postal Telegraph and Cables common (New York)	81	82
Postal Telegraph and Cables preferred (New York)	69	69
Western Union (New York)	63	63½
Westinghouse common (New York)	70	71
Westinghouse preferred (New York)	116	116

LEHIGH VALLEY TRANSIT.

	1913	1912
December gross	$ 140,525	$ 130,702
Net after operation	69,053	61,233
Surplus after charges	13,045	16,548
Twelve months gross	1,774,820	1,541,510
Net after operation	890,876	767,876
Surplus after charges	301,409	262,691

HUDSON & MANHATTAN.

The Hudson & Manhattan Railroad Company reports to the New York Stock Exchange for the ten months ended November 30, 1913, as follows:

Gross	$4,535,389
Net after taxes	2,443,458
Other deductions	221,110
Balance	2,222,348
Interest on bonds	1,680,961
Net inc. avail. for int. on adj. inc. bonds	*541,388

*Includes 276,071, the first installment of interest at $8.34 per $1,000 earned during five months prior to July 1, 1913, leaving $265,317 available for distribution.

PACIFIC TELEPHONE & TELEGRAPH.

The Pacific Telephone & Telegraph Company reports to the New York Stock Exchange, for the ten months ended October 31, 1913, as follows:

Gross earnings	$15,081,892
Expenses*	11,389,052
Net earnings	3,692,840
Other income	177,933
Total income	3,870,772
Interest, etc.	1,991,334
Balance	1,879,438
Dividends	1,440,000
Balance	439,438

*Includes maintenance, $2,730,195; taxes, $609,991; depreciation, $2,281,200; and operating expenses, $5,767,666.

KEYSTONE TELEPHONE.

The report of the Keystone Telephone Company, for the year ended December 31, 1913, compares as follows:

	1913	1912
Gross	$1,265,778	$1,217,428
Net profits	319,077	305,745

From the net profit there was deducted $108,038 for depreciation and reserve, $46,622 for bad accounts, $10,000 for bond discount, and $58,105 for preferred dividends, leaving a balance of $96,311 to be added to the profit and loss surplus.

LAKE SHORE ELECTRIC RAILWAY.

The income account of the Lake Shore Electric Railway Company for the year ended December 31, 1913, compares as follows:

	1913	Increase
Gross earnings	$1,119,312	$66,793
Operating expense	670,604	65,541
Net earnings	448,707	1,252
Other income	25,000	.....
Gross income	473,707	1,252
Interest charges	324,696	1,996
Surplus	149,011	*743

*Decrease.

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER.

	1913	1912
December gross	$ 117,830	$ 110,874
Net after taxes	57,479	53,501
Surplus after charges	37,285	33,791
Twelve months' gross	1,252,904	1,179,839
Net after taxes	540,676	510,816
Surplus after charges	299,311	274,756
Balance after preferred dividends	*221,311	196,756

*Equivalent to 6.3 per cent on common stock.

JACKSONVILLE TRACTION.

The comparative report of the Jacksonville Traction Company, under Stone & Webster management, for December and the twelve months ended with December is as follows:

Month of Dec.—	1913.	1912.
Gross earnings	$ 64,485	$ 48,628
Net earnings	16,781	15,442
Surplus over charges	3,910	4,680
Jan. 1-Dec. 31—		
Gross earnings	679,622	562,537
Net earnings	241,033	184,026
Surplus over charges	97,316	65,039

PERSONAL MENTION.

MR. A. W. McLIMONT, vice-president and general manager of the Michigan United Railways, has been elected vice-president and general manager of the San Francisco-Oakland Terminal Railways Company.

MR. B. D. CHRISTIAN, formerly electrical engineer of the Merchants Light & Power Company, Indianapolis, Ind., has accepted a position with the Crocker-Wheeler Company as sales engineer at Chicago, Ill.

MR. C. F. ZIEGLER, president of the Reynolds Electric Flasher Company, Chicago, is making an extended trip to the south, including visits to Cuba and the Panama Canal, combining business with pleasure.

MR. A. H. MOSHER, Westfield, N. J., has been appointed works manager for the C. & C. Electric Company, Garwood, N. J. Mr. Mosher succeeds MR. W. B. ELLIOTT, resigned, who has been works manager for the past eighteen years.

MR. F. LAURENT GODINEZ, Jersey City, N. J., consulting lighting specialist, tendered an address on "The Physiological and Psychological Functions of Artificial Light" at the meeting of the Hudson County Medical Society, at Jersey City, February 3.

MR. LOUIS D. GIBBS, superintendent of advertising, and MR. W. GRAYDON STETSON, superintendent of the appliance department of the Edison Electric Illuminating Company of Boston, spoke before the students in salesmanship and efficiency at the Boston Young Men's Christian Union, February 3. The stage was fitted to represent the salesroom of a large electric appliance house.

MR. SAMUEL INSULL, president of the Commonwealth Edison Company, returned to Chicago on February 8 after one of his periodical trips to England. While in London he noticed that a decided improvement in the financial situation took place and the long business depression began to give way to an optimistic turn that manifested itself immediately in reduction in bank rates and greatly increased activity in the security market. The gigantic central-station system of which Mr. Insull is head is being pointed out as a model by the financial and municipal authorities who are trying to bring about a combination of the numerous central-station undertakings in London.

MR. J. G. WHITE, president of the J. G. White Companies, has invited a large party of friends and business associates to accompany him on a trip through Florida, leaving New York on February 20. The party will number about 60 persons, and will visit many of the towns where there are electric light, power and ice plants owned by the Southern Utilities Company. The itinerary covers the main railroad line as far as Jacksonville, where the party will branch off to visit the towns of Kissimmee, Lakeland, Punta Gorda, Fort Meyers, Brandentown, St. Petersburg, Belleair and Tarpon Springs. At Tarpon Springs the party will witness a demonstration by the Greek sponge divers. A trip will also be made through the ship canal from Lake Okeechobee to the Atlantic, inspecting the progress that is being made in draining the Everglades. The trip will include a week of recreation at Miami and Palm Beach. The special train of six compartments-sleepers, observation car and dining cars, will return to New York about March 8.

MR. E. H. MURPHY, assistant superintendent of Police Telegraphs of New York City, was retired from active service of February 7. Mr. Murphy went on the police force as a civilian employee, February 17, 1885, working as a telegraph operator. In 1893 he was appointed assistant superintendent of telegraph. At the time of the consolidation of Brooklyn and New York in 1898, Mr. Murphy with a number of others joined the uniformed force. Previous to his connection with the police department he was employed as an operator for the Western Union Telegraph Company, and for a time was employed in the same capacity by the New York *Herald*. Mr. Murphy gained unique distinction in his department by his unprecedented action in dispensing with all rules and red tape and acting upon his own initiative at the time of the burning of the General Slocum in the East River. When the first word of the disaster reached him over the wire, without authority he instantly dispatched every police boat, police surgeon and all of the reserves of the east side precincts and the nurses of the Charities Department to the scene of the disaster. For this action he was warmly commended by Police Commissioner McAdoo.

DATES AHEAD.

Tennessee Electrical Contractors' Association, Memphis, Tenn., February 16.

American Institute of Mining Engineers. Annual convention, New York, N. Y., February 17-20. Secretary, Bradley Stoughton, 29 West Thirty-ninth Street, New York, N. Y.

Electrical Supply Jobbers' Association. New Willard Hotel, Washington, D. C., February 17-19. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

American Institute of Electrical Engineers. Annual mid-winter convention, Engineering Societies Building, New York, N. Y., February 25-27. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York, N. Y.

Central Electrical Railway Association. Cleveland, O., February 26-27. Secretary, A. Neereamer, 308 Traction Terminal Building, Indianapolis, Ind.

State Independent Telephone Association. Des Moines, Iowa, March 10-12. Secretary, Charles C. Deering, 309 Life Building, Des Moines, Iowa.

Telegraphers' Mutual Benefit Association. New York, N. Y., March 11. Secretary, M. J. O'Leary, 195 Broadway, New York, N. Y.

Buffalo Electric Show. Elmwood Music Hall, Buffalo, N. Y., March 9-14. Secretary, Harry S. Hilliker, Electric Building, Buffalo, N. Y.

American Railway Engineering Association. Annual convention, Chicago, Ill., March 17-20. Secretary, E. B. Burritt, 29 West Thirty-ninth Street, New York, N. Y.

Cleveland Electrical Exposition. March 20-30. Manager, William G. Rose, Wigmore Coliseum, Cleveland, O.

American Electrochemical Society. New York, N. Y., April 2-4. Secretary, Joseph W. Richards, South Bethlehem, Pa.

Society of Efficiency, New York, N. Y.,

April 4-11. Secretary, W. H. Tallis, 41 Park Row, New York City.

American Electrochemical Society. Twenty-fifth general meeting, New York, N. Y., April 16-18. Secretary, Joseph W. Richards, Lehigh University, South Bethlehem, Pa.

Iowa Street and Interurban Railway Association. Cedar Rapids, Iowa. Secretary, H. E. Weeks, Davenport, Iowa.

National Electric Light Association. Annual convention, Bellevue-Stratford Hotel, Philadelphia, Pa., June 1-5. General Secretary, T. C. Martin, 29 West Thirty-ninth street, New York, N. Y.

With the Electrical Manufacturers

Connecticut Electric Manufacturing Company, Bridgeport, Conn., is erecting a brick addition to its plant, of three stories, 51 by 150 feet.

Acme Wire Company, New Haven, Conn., is soon to build a reinforced concrete addition to its plant in Camden, of two stories, 60 by 400 in ground dimensions.

Franklin Electric Company, Hartford, Conn., is about to increase the capacity of its Woodbine Street factory by the addition of another story, making the building of three stories, 62 by 34 feet.

The Sanax Company, Incorporated, 123 East Twenty-third Street, New York City, is sending out cards calling attention to a number of its electrical appliances, particularly the Foen hair drier, the Sanax vibrator, the Sanofix vibrator, etc.

Delta-Star Electric Company, Chicago, Ill., is distributing a new folder devoted to a concise description of its "unit type" busbar supports and phase-rotation indicator. Full directions for using this indicator are incorporated and will be of use to operating engineers.

American Steel & Wire Company, Chicago, Ill., in a recent number of *American Wire Rope News*, the house organ of this firm, has published an interesting article with numerous illustrations on proper and improper methods of unreeling and uncoiling wire rope which should prove of interest to those using this material.

The Oshkosh Manufacturing Company, Oshkosh, Wis., has appointed the Union Electric Company, of Pittsburgh, Pa., as its Pittsburgh agents and has arranged with them to carry a large and representative stock of construction tools and specialties on hand ready for prompt shipment. It has been arranged so that Eastern jobbers can use this stock to advantage.

Curtis & Carhart, 150 Chambers street, New York, has been incorporated and will be known in the future as Curtis & Carhart, Inc. W. F. Curtis, president; B. I. Carhart, vice-president and treasurer; P. J. Murley, secretary. The new company will continue to handle "Colonial" motors and generators, and "Colonial" Mazda lamps, "Sterling" insulating varnishes, "Viking" transformers and electrical specialties.

General Electric Company is erecting a group of three buildings at East Boston, Mass., on a site comprising about 170,000 square feet of land recently acquired. The main structure will be 80 to 92 feet in width, with a present length of 260 feet, later to be increased to 650 feet, and of four stories and basement. It is stated that about 1,200 persons will be employed in the new works, which when fully completed will furnish employment to three times that number.

Adams-Bagnall Electric Company, Cleveland, O., announces that there is no basis in fact for the statement attributed to Mr. Beach in the report of the meeting of the Illinois Electrical Contractor's Association on page 180 of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, January 24, that the company had discontinued its Chicago office. The company maintains its Chicago office at 417 South Dearborn Street, under the management of A. J. Selzer, as heretofore.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has issued an eight-page pamphlet on door safety switches for electric elevators. It has been found that a great majority of elevator accidents are the result of starting the elevator machine before the doors are closed and locked and the passengers clear. The type of door switch described in this pamphlet has, therefore, been developed to prevent turning on the power before the door is closed and locked. The pamphlet describes the switches with the aid of numerous half-tones and dimension diagrams.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a 48-page publication dealing with Westinghouse electric starting, lighting and ignition systems for gasoline automobiles. This elaborate pamphlet, which is profusely illustrated, describes first in some detail different types of generators used for ignition and lighting, and the motors for starting both flywheel and crankshaft drive. The single-wire system, which has always been advocated by the Westinghouse company, is thoroughly explained and its advantages clearly brought out. The details of wiring, such as switches, sockets, fuses, meters, and batteries are also discussed. "The Power of a Name" is the title of a circular with an art cover also issued by the Westinghouse company. It contains reproductions of advertisements which have been run by this company in the various popular and technical papers describing its electric ignition, lighting and starting systems.

Safety-Armorite Conduit Company, Pittsburgh, Pa., has prepared a very interesting and neat little 12-page booklet entitled "Wiring the Home." This has been especially gotten up for distribution by contractors and the company is prepared to imprint the name of any electrical contracting firm on the back cover of the booklet. The booklet makes a strong plea for wiring of finished houses and shows both pictorially and with simple explanatory matter that such an undertaking is not so formidable a one as most householders believe it to be. The method of wiring is explained in simple terms and illustrations show how it is carried out. The use of the company's Sterling armored conductors is advocated for this purpose incidentally. The booklet points out the value of electric service not only for lighting but for other household purposes and makes a valuable piece of literature by means of which a contractor can secure a great deal more work of this kind than by random solicitation.

Record of Electrical Patents.

Issued by the United States Patent Office, February 3, 1914.

1,085,598. Ozone Generator. W. O. Freet, Hackensack, N. J., asisgnor to Steynis Ozone Co. Includes a flat electrode on an insulating base, a flat dielectric plate over the electrode and a number of flat strip electrodes supported by racks over the plate.

1,085,608. Circuit-Breaking Means for Motor-Vehicles. H. S. Heath and M. L. Heath, Kenton, O. A pendulum device controlling the ignition circuit of a motorcycle.

1,085,613. Vehicle Fender. A. J. Kolanko, Chicago, Ill. Is connected with circuit-breakers in a motor circuit so as to cut off the power and apply the brakes when a body comes in contact with the fender.

1,085,615. Telephone System. P. Lavery, Webster, and W. E. Bandlow, Dudley, Mass. A lockout system for party lines.

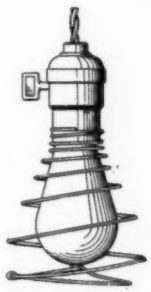
1,085,616. Inductive or Transformer Bond. J. S. Lennox, assignor to Union Switch & Signal Co. Within a cylindrical casing is a laminated core with primary and secondary windings.

1,085,621. Telephone Signaling for Railways. M. Lutenberger, Blocton, Ala. A soundproof hood with side receivers and a transmitter, is adapted to be placed over the engine man's head.

1,085,637. Galvanometer. R. R. Shap, Park Ridge, and M. C. Stoelting, Chicago, Ill. The suspended coil of a D'Arsonval galvanometer carries an indicating finger moving over a scale.

1,085,646. Electric Shut-Off Cock. M. H. Tracy, Worcester, Mass. Has an electromagnetic release and an electric alarm.

1,085,678. Time Recorder. H. T. Goss, Rutherford, and J. W. Bryce, Bloomfield, N. J. Manually and electromagnetically controlled.



1,085,750.—Lamp Guard.

1,085,693. Carriage Attachment for Desk Telephones. H. K. McKinney, Kansas City, Mo. A plate with castors and fingers to clamp about the base of the stand.

1,085,707. Electric-Storage-Battery Negative-Pole Plate. E. W. Smith, Philadelphia, Pa. A powdered inert material is mixed with a finely divided lead compound and filled into the cavities.

1,085,718. Apparatus for Preparing Bleaching and Like Fluids. C. A. M. Buckley, London, England. An electrolytic outfit with a number of anodes in one tank and a cathode in another tank.

1,085,721. Electromagnetic Structure. A. E. Berdon, Indianapolis, Ind. Has a swinging armature provided with a retractile spring held at both ends and carrying a tongue whose free end is connected to the armature.

1,085,726. Railway Signal. J. P. Coleman, assignor to Union Switch & Signal Co. A multipolar stator acts inductively on a rotor connected with the signal so as to move it through a limited angle on either side of a biased mean position.

1,085,743. Anode Support. C. E. Leffel, assignor to Spirella Co., Niagara Falls, N. Y. The anode is cast around the threaded shank of a hook.

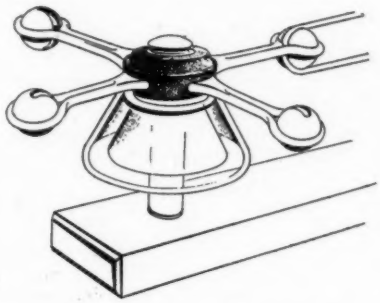
1,085,744. Electroplating Rack. C. E. Leffel and J. D. Leffel, assignors to Spirella Co. A horizontal bar with two inclined arms for securing to a conductor carries U-shaped wire loops to hold the plated articles.

1,085,750. Guard for Incandescent Lamps. J. A. McMichael, Toledo, O. A spiral spring wire guard secured at its smaller end to the socket (See cut).

1,085,769. Spot-Welding Thin Sheets. E. Thompson, assignor to Thompson Electric Welding Co., Lynn, Mass. Consists in clamping the two sheets together, leaving them exposed at spots for application of the welding electrodes.

1,085,802. Electrical Agricultural System. C. S. Doney, Wallace, Idaho, assignor of one-third to J. T. Boyle. Has stationary parallel supply wires and movable transverse feed wires to which a trolley of the machine is attached.

1,085,810. Electromagnetic Relay. J. F. D. Hoge, New York, N. Y., assignor to American District Telegraph Co. Three stationary contacts are located on the same side of the armature which is free to rest simultaneously against the contacts irrespective of their plane.



1,085,813.—Insulator and Distributer.

1,085,807 and 1,085,808. Alternating-Current Motor. V. A. Fynn, London, England. A commutator motor to whose rotor current is separately supplied along two axes.

1,085,813. Insulator and Current Distributer. E. H. Knutz, Arcata, Cal. Supports radial arms with grooved insulating balls in the eye portions of their extremities (See cut).

1,085,826. Indicating Push Button. W. R. Schlage, San Francisco, Cal. Has an indicating shutter in the upper part of the casing.

1,085,829. Trolley-Wire Ear. W. C. Starkey, Zionsville, Ind. Comprises a boss and a grooved extruded metal runner piece having lips to support the trolley wire by clenching.

1,085,840. Portable Grinder. M. F. Apgar, assignor to Taylor Iron & Steel Co., High Bridge, N. J. Mounted on a portable platform is a take-up reel for electric cable, and an electric motor driving the grinder through a flexible shaft (See cut).

1,085,851. Light Support. W. E. Donner, Grand Island, Nebr. For holding a street lamp hood and line insulators on a span wire.

1,085,854. Controller Regulator. H. Elbe, assignor to Lord Mfg. Co., New York, N. Y. For regulating the handle motion of a drum-type motor controller.

1,085,858. Mixer. W. H. Fulton, assignor to Fulton-Bell Co., New York. A small motor-driven liquid mixer.

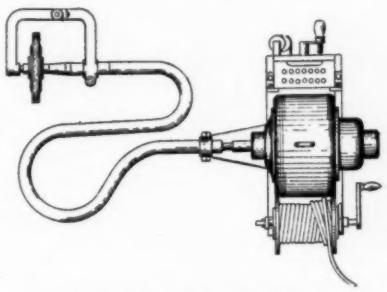
1,085,916. Intercommunicating Telephonic Apparatus. M. R. Hutchison, Summit, N. J. Secured to a person's cap is an adjustable receiver and an adjustable transmitter with sound-excluding mouthpiece.

1,085,920. Electrical Switch. G. A. Knaak, Oshkosh, Wis. A spring switch controlled by fluid pressure.

1,085,937. Automatic Elevator Plant. C. O. Pearson and A. Sundh, assignors to Otis Elevator Co., New York, N. Y. A special engine-driven generator supplies the elevator motor; electromagnetic switches control the starting and stopping of the engine and motor.

1,085,943. Electric Self-Playing Violin. H. K. Sandell, assignor to Mills Novelty Co., Chicago, Ill. Motor-driven and electrically controlled through a music roll.

1,085,947. Adjustable Electric-Light Fixture. T. Smith, assignor to Theo. Smith Mfg. Co., Chicago, Ill. Has two telescoping parts, one carrying the lamp.



1,085,840.—Portable Grinder.

1,085,951. Electric Fusion of Metals. A. P. Strohmenger, assignor to Ester & Co., London, England. Consists in placing two metal rods parallel to each other and placing between them a layer of fusible insulating material adapted to form a slag, connecting the rods to the terminals of an electric circuit, passing an arc between the rods and collecting the fused metal as it drops.

1,085,952. Combined Friction and Spur Gearing for Traction Elevators. A. Sundh, assignor to Otis Elevator Co. Provides special gearing between the motor and drive sheave.

1,085,959. Terminal for Secondary or Storage Batteries. J. W. Achard, Philadelphia, Pa. The lead busbar between end cells of stationary batteries has a copper connecting bar partly imbedded therein.

1,085,960. Electric Connector. J. Berg, assignor to Metal Specialties Mfg. Co., Chicago, Ill. A bayonet style plug and sleeve.

1,085,974. Telephone System. E. R. Corwin, assignor to Corwin Telephone Mfg. Co., Chicago, Ill. Includes special busy-test equipment.

1,085,981. Block Signal System. L. A. Hawkins, assignor to Union Switch & Signal Co., Swissvale, Pa. A relay-controlled railway-signal system.

1,085,982. Electrical System of Distribution. H. Hazelton, Englewood, N. J., assignor to Gould Storage Battery Co. A storage battery is arranged to be charged in series with lamps, and to light a different set of lamps when the power is off.

1,085,987. Reversal Regulator for Single-Phase Motors. D. L. Linquist, assignor to Otis Elevator Co. Prevents operation of the reversing switches until the speed of the motor has been reduced.

1,086,010. Influence Machine. B. E. Baker, Hartford, Conn. A static machine including generating plates, field combs, connecting combs and main discharge terminals with means for regulating the field strength.

1,086,028. Electrical Protective Device. F. B. Cook, Chicago, Ill. A fuse support for a telephone terminal rack.

1,086,029. Indicating Ringing Key. E. B. Craft, assignor to Western Electric Co. For telephone party lines; on release of the key that has been depressed, it projects above the remaining keys of the set until another key is depressed.

1,086,040. Intermittent Searchlight. F. Giannattasio, New York, N. Y. The mechanism is driven by an electric motor.

1,086,041 and 1,086,042. Welding Machine. J. H. Gravell, assignor to Hale & Kilburn Co., Philadelphia, Pa. A transformer type electric welder.

1,086,044. Coin Control for Motor Vehicles. A. D. Grover and E. E. Barber, assignors to A. P. Browne, Cambridge, Mass. An indicator with a motor-circuit-closing hand.

1,086,049. Printing Telegraph Receiver. G. S. Hiltz, assignor to Stock Quotation Telegraph Co., New York, N. Y. An electromagnetically controlled type wheel.

1,086,069. Safety Appliance for Railway Cars. C. M. Mock and A. U. Gerber, Chicago, Ill. Electromagnetically operated valve for an air-brake system.

1,086,072. System and Apparatus for Electrically Selecting and Controlling a Number of Elements from a Distant Point. N. H. Morrison, Meredith, N. H. Includes separate and group conductors and switches for units, tens and hundreds.

1,086,079. Method of Maintaining the Efficiency of Brass-Pickling Solutions. R. R. Parish, assignor to Chase Rolling Mill Co., Waterbury, Conn. Consists in providing continuous circulation of the unspent solution through an electrolyzing tank whereby a continuous electrolysis of the solution is maintained.

1,086,080. Snap Socket Shell. C. D. Platt, assignor to H. D. Sears, Boston, Mass. Special means for locking the shell and cap of a lamp socket.

1,086,083. Electric Bell. H. E. Reeve, New York, N. Y. Covers details of construction.

1,086,088. Manufacture of Filaments for Tungsten Lamps. G. P. Scholl, assignor to Westinghouse Lamp Co. Consists in making a paste of metallic tungsten and casein, forming filaments therefrom, and passing current through the filaments while in an atmosphere containing hydrogen.

1,086,096. Field-Coil Support. C. W. Starker, assignor to Westinghouse Electirc & Mfg. Co. Has spring grids between the coils and yoke.

1,086,101. Means for Transforming Electrical Energy. E. Weintraub, assignor to General Electric Co. A mercury-vapor lamp with an auxiliary or starting electrode containing graphite and clay.

1,086,102. Method of Transforming Electrical Energy. E. Weintraub, assignor to General Electric Co. The method of securing stable operation of a mercury-arc lamp consists in supplementing the production of vapor by locally generating ionized vapor.

1,086,103. Electric Lamp. E. Weintraub, assignor to General Electric Co. Has a mercury cathode and a co-operating anode of graphite.

1,086,104. Producing Light by Electricity. E. Weintraub, assignor to General Electric Co. A modification of the above.

1,086,105. Vapor Electric Apparatus and Method of Operating the Same. E. Weintraub, assignor to General Electric Co. The lamp is started by ionizing the residual mercury vapor through an initial discharge between a solid auxiliary anode and the mercury cathode.

1,086,106. Vapor Electric Apparatus. E. Weintraub, assignor to General Electric Co. A mercury-arc rectifier has its anodes protected in partly isolated chambers.

1,086,107. Electric Lamp. E. Weintraub, assignor to General Electric Co. An electromagnet is provided to tip the tube and start the mercury arc.

1,086,109. Rheostat. N. Wilkinson, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. A liquid rheostat with movable barriers between the electrodes to vary the resistance.

1,086,132. Process for the Industrial Manufacture of Electrolytic Iron. A. Boucher, assignor to Société "Le Fer," Societe Anonyme, Grenoble, France. A step in the process consists in regulating access of air to the electrolyte to produce sufficient basic iron salts to effect the depolarization of the cathode.

1,086,147. Electrical Connection for Telephones and the Like. J. A. Douglas, Waterloo, Iowa, assignor of one-fourth to A. O. Goff. For readily connecting a removable wall set to stationary circuit terminals.

1,086,164. Electric Furnace. B. Guthrie and J. P. Karch, assignors to C. P. Carpenter, Pittsburgh, Pa. The electrodes are of a shape and so located as to almost completely encircle the crucible.

1,086,165. Electric Heating and Cooking Device. W. S. Hadaway, Jr., assignor to Westinghouse Electric & Mfg. Co. The heating element consists of a plaited resistance ribbon and notched insulating strips fitted into the plaits.

1,086,171. Process of Treating Incandescent-Lamp Filaments. R. H. Henderson, assignor to Westinghouse Lamp Co. Consists in applying to a metal filament an excess current in an atmosphere of phosphorus.

1,086,185. Vapor Electric Apparatus. O. O. Kruh, assignor to General Electric Co. A mercury-arc rectifier with an insulating shield for each of the anodes.

1,086,186. Vapor Electric Device. O. O. Kruh, assignor to General Electric Co. Has a baffle plate between the anode shields.

1,086,196. Electric Whistle-Blowing Apparatus. E. C. McCaffrey, Burlington, Vt. A normally closed circuit has a solenoid arrangement to open it and sound the alarm.

1,086,234. Automobile Signal. W. I. Smith, Silverlake, Ind. A lamp socket and lamp are held in a U-shaped section of a rotatable shaft in a cylinder.

1,086,249. Electric Switch and Locking Means Therefor. R. H. Vickers, Fayetteville, Ark. A push-bar lamp-socket switch.

1,086,278. Car-Feeding Device for Tunnel Furnaces. A. H. Cowles, Sewaren, N. J., assignor to Electric Smelting & Aluminum Co. Electrically controlled and motor driven.

1,086,300. Rectifying Apparatus. C. A. Kraus, Newton Highlands, Mass. Includes two transformers, two reactances and two mercury-arc rectifiers which are cross-connected.

1,086,301. Means for Operating Street and Station Annunciators for Cars. T. G. Leavell, Spokane, Wash. Spaced contacts on the trolley wire act on an arm on the trolley pole of the car.

1,086,303. Headlight. W. T. Moran, Quincy, Mass. The lamp socket can be withdrawn from the reflector against the force of a spiral spring.

1,086,311. Electric Arc Lamp for Searchlights, Projectors, and the Like. H. Beck, Meiningen, Germany. The method of operating consists in employing a high current density to produce a tongue in the negative flame and deflecting the tongue away from the center of the positive electrode by a jet of gas.

1,086,327. Spark Plug. M. G. Kopf, assignor to McCormick Mfg. Co., Dayton, O. Covers details.

1,086,334. Tracker Bar. L. M. Sanders, assignor to G. H. Davis, West Orange, N. J. A metallic reed over each air duct governs an electric circuit including the musical instrument.

1,086,338. Insulating Lining. C. L. Sherman, Philadelphia, Pa. For an incandescent lamp socket.

Patents Expired.

The following United States electrical patents expired February 9, 1914:

576,545. Apparatus for Electrically Heating Metal. G. D. Burton, Boston, Mass.

576,551. Telephone Transmitter. M. E. Clark and E. C. Clark, Minneapolis, Minn.

576,577. Telephone System. A. S. Hibbard, Chicago, Ill.

576,621. Electric Switch. M. Schalscha, Hoboken, N. J.

576,622. Electric Locomotive and Railway System Therefor. M. Schalscha.

576,683. Controlling Mechanism for Projectors. J. MacHaffie and E. F. G. H. Faure, Schenectady, N. Y.

576,710. Ventilated Fuse-Plug for Electric Circuits. H. C. Wirt, Schenectady, N. Y.

576,720. Galvanic Battery. H. J. Brewer, New York, N. Y.

576,721. Trolley System. W. G. Caffrey, Reno, Nev.

576,732. Electrical Regulating Device. J. F. Kelly, Pittsfield, Mass.

576,766. Electric Heating Apparatus. A. Robertson, Taunton, Mass.

576,802. Electric Arc Lamp. H. Baurlin, Aarburg, Switzerland.

576,804. Telephone Apparatus. C. E. Buell, North Plainfield, N. J.

576,813. Telephone Transmitter. J. F. Gilliland, Adrian, Mich.

576,933. Electric Lighting for Vehicles. J. A. Ageron, Paris, France.

576,936. Battery. F. B. Badt, Chicago, Ill.